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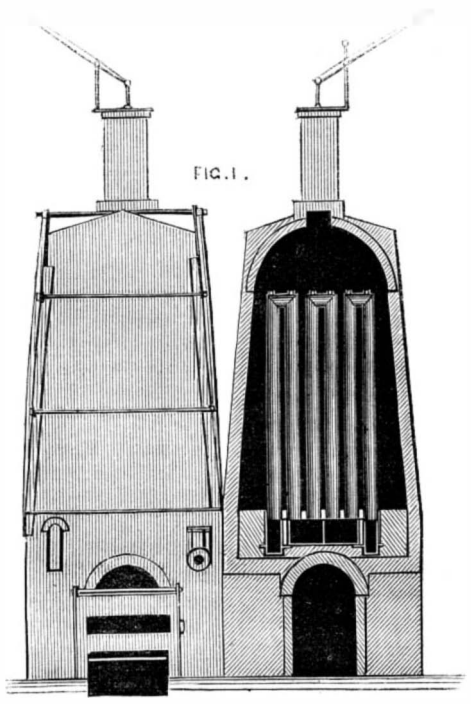
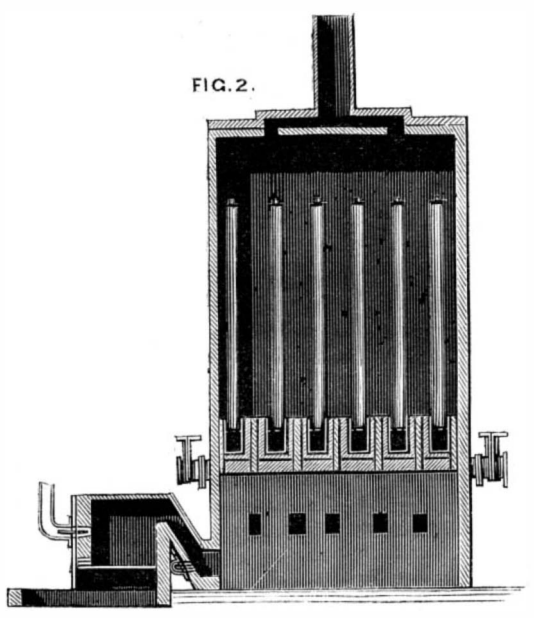
Stove for Heating Furnace Blasts.

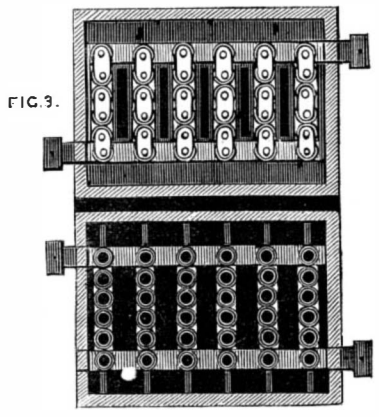
An ingenious mode of utilizing the waste gases from blast furnaces has been invented by Mr. John Player, of Norton, Stockton-on-Tees, England, by which they are drawn into a stove by a steam jet and consumed to heat the blast for furnace with either closed or open tops. It is well known to iron-workers that a highly heated blast is very effective in the fusing of the ores. Where the waste gases are consumed in contact with the pipes they must be kept at a red heat which, in time, disintegrates and destroys their material. Mr. Player's stove consumes the gas in a separate chamber from that containing the pipes to be heated; sufficient air is allowed to enter to cause an intense heat; the heated fumes escape through a series of narrow slots into an air-tight chamber having a damper on the top and containing a series of vertical pipes through which the blast to be heated travels. As the highly heated fumes will not again ignite without a fresh supply of oxygen, the cast-iron blast-pipes remain uninjured under a heat of 1,100° or 1,200°.

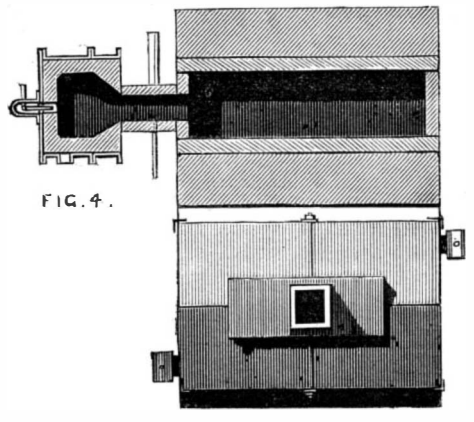
An auxiliary fireplace for burning coal is shown attached to the hot blast stove, which is only used at places where gases are not utilized, as is shown in Figs. 2 and 4. From this fireplace a flue conducts the flame and smoke into the combustion chamber where the combustion is completed. Attached to the end of this fireplace (merely for convenience of illustration) is shown a branch gas pipe with a small steam jet placed near its orifice to create a partial vacuum and this branch gas pipe is connected with flues at the furnace top. This draws the gases down from the furnace top and forces them into the stoves where they are burnt. Where this branch gas pipe and steam jet are used there no necessity for using the fireplace. They may be placed at the bottom end of the combustion chamber of the hot-blast stove, where the flue of the fireplace is shown in Fig. 2.

The arrangement of pipes is shown in the engraving: each stove contains 18 pipes, 8 inches in diameter by 14 feet high, giving about 1,000 square feet of heating surface. The pipes are disposed three in a row; the blast thus passing up and down three times, as is shown in Fig. 1. The steam jet in the branch gas pipe enables the furnace manager to control all the gases in the blast furnace to be used in stoves, etc., which by this means will work effectively when placed on the ground.









STOVE FOR HEATING FURNACE BLASTS.

Already nearly a hundred of these stoves are in operation in England, giving unqualified satisfaction, in some cases having increased the quantity of ore melted with a given amount of coke from 34 to 40 per cent on account of the higher temperature of the blast. Mr. Barton, manager of the Carnforth Hematite Iron Works, at which sixteen of these stoves are in operation, writes to the inventor: "As regards the stoves, they continue to work very well, getting fair heats. I may say that we use no coal whatever, either for our boilers or stoves, and from the first we have never had the slightest trouble in using gas under your stoves."

James Henderson, 218 Fulton street, this city, is the agent for these stoves in this country, and he will furnish iron manufacturers and others interested any further information desired.

STEAM ON A STAMPEDE.

Translated for the Scientific American.

The late civil war in Germany, which has been remarkable for its rapidity of movements as well as for its immense devastations, has given rise to a new kind of war scenery, which was created by the use of steam and electricity.

The splendid railroad bridge across the Elbe at Pisa, the destruction of which became strategically necessary, was the first victim, and its ascending flames gave the first signal to the numerous locomotives and rail cars of Saxony to begin their inglorious but still remarkable flight toward the Austrian frontier.

The Prussian army, its right wing on the Elbe, invaded Bohemia and did not seem to care much about the railroads in the western part of Saxony. The traffic was therefore continued on these roads and was according to the movements of the Prussians more or less reduced. On June 17th the latter took possession of the town of Waldheim and the passenger train arriving at the same time from Chemnitz was warned to return as speedily as possible. It had now become evident that the danger to these roads was great, the enemy not only tearing up the track and destroying all the bridges and tunnels, but also carrying off all the rolling stock that could possibly be made available. In Chemnitz the approach of the Prussians was announced, and all the rolling stock was thence brought to Zwickau, where, on the night of the 18th of June, forty-two locomotives and several hundred wagons arrived. Long trains, with three or four locomotives at their head were formed and left Chemnitz under the applause of the Saxons. The last two locomotives barely escaped falling into the hands of the Prussians, whose vanguard arrived just as they left.

All these encounters with the Prussian vanguard were merely accidental; the main danger for the rolling stock rapidly accumulating at Zwickau, threatened from a quite different quarter; the blow to be dealt was well considered, and showed, as did all the movements of the Prussians soon after, that they not only knew all the important points in the enemy's country but also the best means of securing them for their own benefit.

By looking at the map it will be seen that the railroad from Chemnitz, passing Zwickau, joins at Werdau with the line which connects Leipsic with Hof, a city in Bavaria. From the latter road, at a small station called Herlasgruen, a single track is laid to Eger, in Bohemia. That point beyond Werdau, where the two main lines which go from Leipsic and Chemnitz to Bohemia and Bavaria meet, is called the Werdauer curve, and if it falls into the hands of the Prussians, the entire rolling stock on both these roads, especially that which has accumulated at Zwickau, is cut off, and must fall into the hands of the enemy. The importance of retreat toward this point, was already shown on the 19th. The same corps of the Prussians which entered Leipsic at daybreak of this day, at once took possession of the depot and all the locomotives and wagons, and prepared a train for following the flying trains to Zwickau. A few precious hours were lost in preparations, and at six o'clock the trains left, and the great railroad race was inaugurated. The danger was felt in Zwickau, although no positive news of the enemy's approach had arrived; it had been too quick in the Leipsic direction, and suspicions were consequently aroused. On the night of the 18th long trains left the Zwickau depot, drawn by the most powerful engines, and went without stopping to Reichenbach, in Bavaria. Long trains of locomotives were among them. At the latter place the news of the arrival of the Prussians at Leipsic was received, and as if the fires in the boilers had received an independent spirit, a sudden mysterious life seemed to be imparted to the iron horses and their long appendages, and away they went in inglorious haste toward Hof. Nineteen locomotives and several hundred wagons raced thither. The bridge across the Goeltzich valley, which is more than a thousand yards long, and which is higher than most spires in Europe, is crossed in haste. In peaceful times the trains are most carefully signaled, and their speed is slackened as they approach this structure; but today they run across with roaring noise, making the mountains resound with their thundering echoes. The people in this valley will forever recollect this night. Aroused from their slumbers by a noise resembling the roar of great water floods, they jump frightened out of their beds. But behold fiery eyes look down upon them from the roaring monsters; shrill whistles intermingle their horrid sound with that of the thundering wheels. Yes, it was a train, and no flood; but what a train! With wondering eyes they could, in the twilight of the summer morning, see the endless line of cars moving across the magnificent bridge. A mighty column of steam and smoke rolls along, over and beyond the train, disappearing behind the far-off mountains. But now, train comes after train, wagon after wagon, all fleeing from Zwickau; the enemy has already left Leipsic on the wings of steam.

The Prussian train arrived at Altenburg from Leipsic as the mail train from Hof, not knowing of the late advances of the Prussians, was about to leave for Leipsic, and this mail train would certainly have fallen into the hands of the Prussians had they not been in too much haste, but, as it was, the mail train was warned and turned off to the right, returning to Goessnitz and thence to Werdau, giving the disagreeable information wherever it arrived. At Werdau everything was ready to start, and in a short time the whole depot was swept of the twenty-five locomotives and numerous wagons that had arrived there, and long lines of trains were again fleeing, as fast as possible, the last engine leaving just as the Prussians became visible on the opposite side. The race now began, of the dimensions of which nobody can form an idea. The trains from Werdau united at the Werdauer curve with those from Zwickau. The fugitives went with the swiftness of the wind on both tracks at the same time. For a distance of eighteen miles, between Werdau and Herlasgruen the whole track was covered with the fleeing trains and engines. All order had ceased, confusion reigned supreme; first and second-class cars, coal cars, wood and mail cars, locomotives of different classes, all mixed together, each trying to evade the victorious enemy. Even the most prudent man must have felt uneasy, for what would have been the consequence if but one of the thousands of wheels had run off the track?

A fleeing army thundered along and announced war and misery. Peace and happiness seemed to leave the country with the empty wagons. In Reichenbach the flood came to a stop, on account of want of water. The depot there, which is over a thousand yards long and very wide, was completely filled with trains, and the power which should set all these masses in motion, slumbered in the reservoir, which was considerably distant from the town. Great embarrassment was thereby occasioned. Should all these rolling treasures, after having so far successfully evaded the enemy, still fall into his hands? No! Parties are sent up the road to tear up the track as soon as the train with the Prussians should appear. The water which is used to supply the town of Reichenbach is all conducted to the depot from the reservoir, and when it began to flow courage and hope returned again; the trains began to move on both tracks and arrived safely at Herlasgruen, thence to leave for Eger. At Herlasgruen the same want of water detained many trains which were not sufficiently provided with the precious liquid to enable them to pass that town; but they were supplied by the friendly inhabitants,

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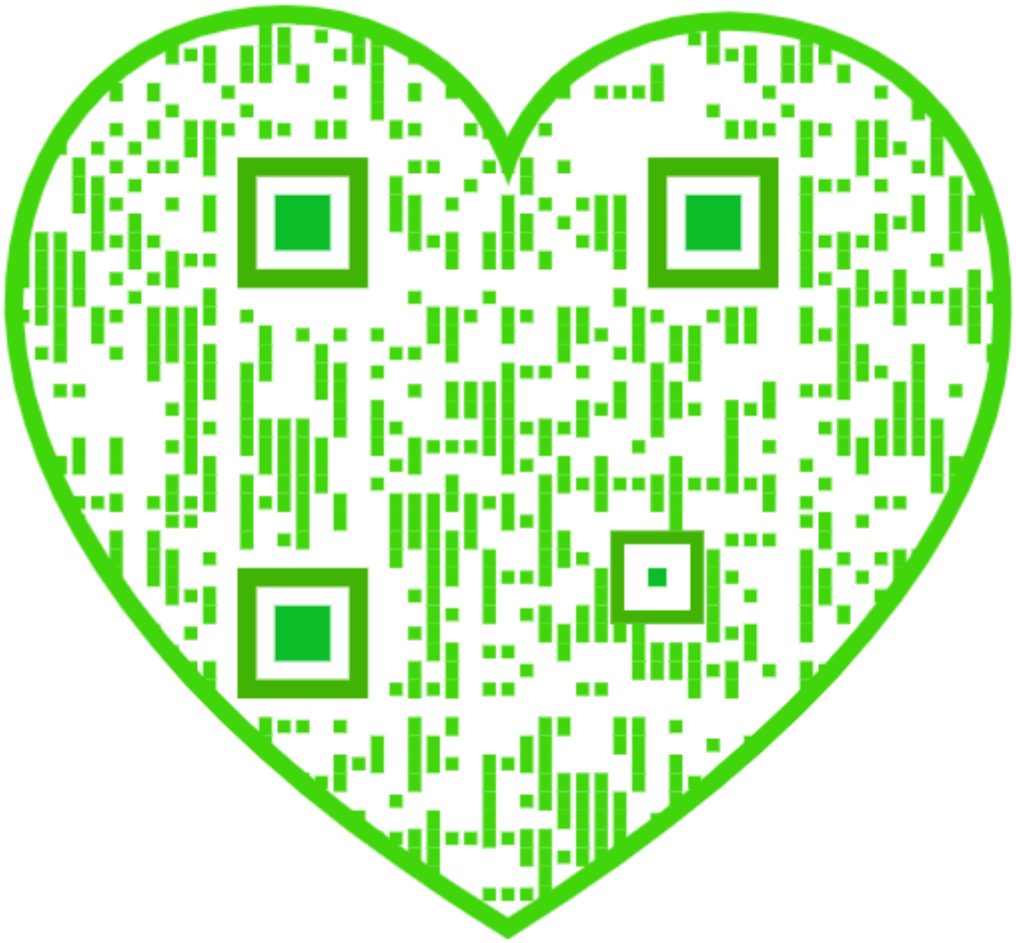

who brought it in pails, pots, cans, and barrels; thus the whole army of wagons arrived safely at Eger, where on the 20th of June more than 140 Saxon locomotives and thousands of wagons were stationed.

The Prussian expedition, which left Zwickau a day later, soon found that the trains had successfully escaped. The men who imperiled their lives by taking care of the railroad property deserve our admiration as much as the bravest soldiers on the field of battle.

The fleeing masses have since returned and have brought the much-desired peace with them. All the dams thrown across the track have again been levelled. May the dams thrown across the road of civilization be also removed and levelled, and, if possible, by the agency of the locomotive which unites all nations more completely and better than all the cannon, orations, and banquets of the world.—*Gartenlaube, Leipsic.*

A METHOD OF CONTROLLING THE PRODUCTS OF THE BESSEMER PROCESS.

PREPARED FOR THE SCIENTIFIC AMERICAN BY DR. ADOLPH SCHMIDT.

(Concluded from Page 136.)

The regular practice of the three trials above described, after each Bessemer charge, will enable the manager of the process to compare the phenomena observed during its course with the results obtained, and thereby to acquire very soon a far more exact practical and theoretical knowledge of the process, and much greater certainty in conducting it than would be possible without the testing. But to extend this certainty to the subsequent working or selling of the raw metal, and to give to this experience a high practical worth for the Bessemer trade, well-determined exterior signs are necessary, which may prevent the ingots from being sold or used for other purposes than they are adapted for. To this end all the metal resulting from the process must be divided into a certain number of classes, the metal of each charge must be adjudged according to the results of the three testing operations described, to one of these classes, and the ingots of the charge must be marked with numbers or other exterior signs, indicating the class to which they belong. As the testing operations are made after the casting of the small ingot, without delay, and can be done in little more than half an hour, the large ingots of the same charge will still be hot and soft after the trial has been made, and the number decided upon, can easily be stamped upon each of them. The numbers should also be marked in a charge journal, kept regularly, and giving an account of the raw material, the more important phenomena, and the results of the charge.

According to experience in the Austrian Bessemer works I believe that the most convenient division of the Bessemer products will be in five classes or numbers whose characteristics I will endeavor to give in the following statement:

Number I. is the hardest kind of Bessemer metal, and resembles the harder kinds of cast steel in common with which it requires to be forged at a certain and carefully chosen temperature. This temperature is indicated by a not too bright yellow color in the heating furnace and metal. If the temperature is raised to a bright yellow or lowered to a light red, this hard kind of Bessemer steel will break in being forged or bent. Having, from its chemical composition and molecular structure, a natural tendency to hardness, it is capable of being hardened to a very high degree, so as to be useful for the manufacture of turning chisels, small files and surgical instruments. It can, when hardened, be bent but a little without breaking, and exhibits a very perfect elasticity returning energetically to its shape after being bent. Its fracture is slightly conchoidal and smooth, the grains being too small to be distinguished by the eye; color, a very light gray. It contains chemically about 1 per cent of carbon. On being tested as to its tensile strength, it extends not more than 5 per cent of its original length, and breaks under a strain of 125,000 to 150,000 lbs. to the square inch of sectional area.

Number II. has similar qualities with No. I., though less sharply pronounced. It is equally a true steel, and can be used for making chisels, larger files, axes and even scythes if the general quality of the metal is very good. It will also do good service as head plates for rails. Entire rails made of this number, though resisting very well, would be too liable to break. It allows greater differences of temperature in being forged, not cracking or breaking in a moderate or in a bright yellow heat. It is generally softer than No. I., but hardens perfectly well, and cannot then be bent durably to any considerable extent. Though its elasticity is nearly as perfect as that of No. I. its elastic force is remarkably less. Its fracture is less smooth, showing the granular structure more distinctly, and presents no conchoidal but an even surface. It contains about $\frac{3}{4}$ per cent of carbon, and has a tensile strength of 100,000 to 150,000 pounds per square inch, with a corresponding extension of 15 to 5 per cent; the extension being the smaller, the greater the strength.

Number III. has still steel-like qualities in a remarkable degree, but cannot be considered as a true steel. It resembles in its properties the ordinary kinds of puddled steel. It is the best material for tires, being hard enough to resist impressions from the rails, soft enough not to injure them, and tough enough not to break. It can also be used and do good service as head plates of rail piles and for rolling entire rails. It is much less sensitive in regard to temperatures than the former, and can, if it is of a good quality in general, be forged and bent without cracking at all temperatures between bright red and welding heat. It can be hardened, though not as easily or perfectly as the former numbers. Its elasticity is much less perfect, and it does not quite resume its original form after bending when hardened. It cannot however be bent considerably in this condition. Its fracture is even but of a darker color and larger grain; the single grains can be seen in the structure with the eye. It contains about $\frac{1}{2}$ per cent of carbon, and has a tensile strength of 80,000 to 100,000 lbs. per square inch, extending at the same time between 20 and 15 per cent of its original length before breaking.

Number IV. has scarcely any qualities of steel, and had better be considered as a hard kind of wrought iron, having a somewhat steel-like, grainy structure and appearance. It can be forged and bent at all temperatures down to a pretty dark red. It does not get much harder by being heated and cooled in water, and can be bent, after cooling, to an angle of about 150°. When broken slowly the surface of its fracture is grainy, uneven and often partially fibrous. It resembles in its appearance and qualities what is called in Germany "Fein korn," i. e., fine grain iron, which is manufactured in puddling furnaces by a process similar to steel puddling and is chiefly used for head plates of rail piles.

The Bessemer metal No. IV. will also suit that purpose, but it will also prove an excellent material for rolling entire rails, and its softer varieties make good boiler-plates. Harder kinds of the metal have been tried for making boiler plates, but did not stand the change of temperature well enough. Number IV., contains about $\frac{1}{4}$ per cent of carbon. It breaks at a charge of 70,000 to 80,000 lbs. per square inch, extending before the rupture between 25 and 20 per cent.

Number V. stands very near real wrought iron, being however generally less fibrous in structure and less soft than the purest kinds of the latter. It is more difficult to work or bend, and has a higher degree of tenacity than ordinary wrought iron. When manufactured with care and from very pure pig iron, it will replace wrought iron in a great many instances. Compared with the preceding numbers it is a very soft and tough material. It can be hammered and bent without breaking at all temperatures from 40° up to 3,600°. It cannot be hardened, but will bend to an angle of 90° and more, after having been heated and cooled in water. Its fracture is partly fibrous and partly grainy, with large dark-colored grains. It welds very perfectly, though not always quite as easily as wrought iron, and greater care has therefore to be taken in the operations with this material than is required in welding common wrought iron.

It contains only about 0·05 per cent of carbon. The tensile strength or tenacity is between 60,000 and 70,000 lbs. per square inch, and it extends before breaking from 30 to 25 per cent of its original length. It is an excellent material for the manufacture of boiler plates, car and locomotive axles, and large forgings of all descriptions.

It has been observed at the Bessemer works of Neuberg, in the Austrian province of Steria, where most of these observations have been made, that if the process is interrupted exactly at the moment which is the easiest to recognize, when the flame begins at last to diminish in brightness and to flicker, before it shortens remarkably, No. V. will be obtained without any addition of Spiegel or pig iron. But if molten pig iron is added, the resulting metal will, by the addition of every 3 per cent, become one number harder, so that 12 per cent is necessary for producing No. I., after a good and regular charge. This may however be different with different materials, and must be determined by special experience with each kind of pig iron.

If we compare the condition of the Bessemer trade in Austria—where Bessemer metal is already used in the place of cast-steel, as well as of wrought iron, and where, for instance, locomotives are made in nearly all their parts of the different kinds of the metal—with the condition of the same trade in England, where the manufacturers are not yet able to furnish rails and tires of a quite reliable quality, and where the metal has till now but a very low credit for all other purposes, the great practical value of the method above described will become apparent. For the difference in the purity of the pig iron used in these two countries is not considerable enough to account for this great difference of public confidence in the products of the process, and the superiority of the German Bessemer industry, in this respect, must chiefly be ascribed to the more careful and scientific manner in which the process is there conducted.

THE LATE ALEXANDER DALLAS BACHE.

Dr. Franklin, justly reverenced as one of the fathers of modern science, has been fortunate likewise in his other posterity. His only daughter, Mrs. Richard Bache, was worthy of her parentage, in intelligence, force of character, and devoted patriotism, and transmitted to posterity the intellectual rank, the personal virtues and even the scientific bent of her illustrious progenitor. Her son, Benj. Franklin Bache, was an able journalist, and her grandson, Alexander Dallas Bache, has just died, ripe in years and honors, leaving a name already long claimed by the scientific world as its own. The names of FRANKLIN and BACHE will thus be associated in the records of science and in the regard of mankind. The first Bache from England (Richard) the son-in-law of Franklin, also bore an honorable part in the history of his adopted country, having been president of the republican society of Philadelphia at the beginning of the Revolution, and Postmaster General of the United States during the war. Philadelphia, rich in historic honors, shares in the same happy association, having been the residence of all and the birthplace of the latter two, of this noble line.

Prof. Bache was born in Philadelphia, on the 19th of July, 1806. He graduated at West Point, in 1825, at the age of 19, at the head of his class—never having received a mark of demerit—was commissioned a lieutenant of topographical engineers, and remained for one year at West Point as assistant professor. From twenty-one years of age to thirty-five, he was professor of mathematics in the University of Pennsylvania; next, the first principal of the Central High School of Philadelphia, being transferred to the chair of Natural Philosophy and Chemistry in the University; traveled in Europe in behalf of Girard College, and presided over that institution from 1843 to 1853, when he was appointed to the great work of his life, as Superintendent of the Coast Survey. Of this work nothing could be more fitly spoken than the official tribute from the Secretary of the Treasury, Hon. Hugh McCullough:

Under his direction that great national work has been eminent, no less for its abundant results than for its high scientific character, which has won the approbation of the leading learned bodies of the world, among whom his name has long been held in honor.

That the deceased Superintendent had become illustrious in America and in Europe is due to the steady devotion of his great talents to the service of the people. His genial disposition attracted the love of associates and of subordinates; his wisdom commanded their respect. He leaves us a name of unsullied purity, and a memory that adds lustre to the many public records upon which it is borne.

All remember the many testimonies to the vital importance of the results of the Coast Survey, which are bound up with the exploits of our navy in the late civil war, at Port Royal, New Orleans, Charleston, Savannah, Mobile, Fort Fisher, etc. Every topographical datum required for successful approach and attack in those waters, had been placed by that means in the hands of our naval and military commanders, and it is not too much to say that the Coast Survey was one of those leading providential preparations without any one of which the failure of the war would have been morally inevitable.

Prof. Bache's long and final illness was softening of the brain, and he died at Newport, R. I., on the 17th of February, in his 61st year.

Prof. Agassiz, in his lecture on Thursday evening, remarked that the Coast Survey of the United States is the most perfect coast survey ever made in the world, and that it is the work of Bache in its perfection. He had the talent to apply to practical purposes the most advanced results of science, and to make his practical work contribute to the progress of science, in a manner which has advanced geography in America far beyond what it is anywhere else.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, February 14th, Prof. Tillman presiding.

The President read, as his usual summary of scientific items a condensed statement of the seventeen principal points proved in a course of lectures on chemical and dynamical geology, delivered by Dr. T. Sterwy Hunt, F. R. S., before the Lowell Institute of Boston.

A VOICELESS DUCK.

Dr. Rowell exhibited to the society the throat of an unfortunate duck, which when living was incapable of uttering any sound owing to the enlargement of the bronchial tubes. The case was brought forward as an illustration of his theory, that in the larynx there reside organs of speech, which if once destroyed are never renewed.

BEET SUGAR.

The discussion on this subject was resumed. Mr. Grant believed it clearly proven that beet sugar can be made here cheaper than cane sugar imported from Cuba. Minnesota, he considered to be the state most favorable for its production and manufacture. The soil of New Jersey is also admirably suited but the high value of land is a serious objection to its being profitably grown. More sugar is produced from beets than from equal quantities of cane. The usual product of cane sugar in Cuba is 1700 lbs. to the acre, but in Illinois there is no difficulty in raising beets that will yield 2000 lbs. to the acre.

The climate required for raising beets is the very opposite of that necessary for the successful cultivation of the cane, the colder latitudes being more favorable than hot or tropical ones. After some further discussion the meeting adjourned having selected "Bridge Building" as the subject for the next meeting.

The able article on beet sugar cultivation, read by Dr. Hirsh before this body a few evenings since, we have been permitted to use, and a portion of it appeared in our last issue. The crowded state of our columns necessitates deferring the remainder until next week, when the second and concluding article will be published.

Production of Natural Colors by Photography.

M. Niepce de St. Victor has recently communicated to the French Acadèmie des Sciences the results of his latest researches, having for object to obtain and fix the colors of nature by means of photography. His paper is full of very important, new and interesting facts, proving that the fixation of natural colors on the ptotographic tablet as a practicable and available result, which for a long time has been considered as a dream, is not perhaps so far from being fully realized—not as a mere scientific experiment, but as the completion of the splendid discovery of photography.

The process of M. Niepce de St. Victor may be shortly described as follows:—The silver plate must first be chlorurised, and then dipped into a bath containing fifty centigrammes of an alcoholic solution of soda for every 100 grammes of water, to which a small quantity of chloride of sodium is then added. The temperature of the bath is raised to about sixty degrees centigrade, and the plate is only left in for a few seconds, the liquid being stirred all the time. The plate being taken out, it is rinsed in water and then warmed until it acquires a bluish-violet hue, which is probably produced by the reduction of a small quantity of chloride of silver. The plate is now coated with a varnish composed of dextrine and chlor

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ide of lead. In this way all the colors of the original, including white or black of more or less intensity, are reproduced, according as the plate has been prepared, and as the blacks of the copy are either dull or brilliant. The reduction of the chloride should not be too great, because otherwise nothing but pure black or pure white could be obtained; and in order to avoid this inconvenience a little chloride of sodium is added to the soda bath. A few drops of ammonia will produce the same effect. By this process a colored drawing, representing a French guardsman, was reproduced by M. Niepce, with the exception of one of the black gaiters, which he had cut out and replaced with white paper. The black hat and the other gaiter produced a strong impression on the plate, while the white gaiter was perfectly reproduced in white. Much more intense blacks may be obtained by previously reducing the stratum of chloride of silver by the action of light; but then all the other colors lose their brilliancy in proportion.

This production of black and white is a considerable step in heliochomy. It is a most curious and interesting fact, for it would prove that black is not entirely the absence of light, but is a color of itself, producing its own effects, as well as the other colors. This was illustrated by the experiment made at the suggestion of M. Chevreul, the celebrated member of the Acadèmie des Sciences, whose known researches on the contrast and effect of colors are so instructive and interesting. Accordingly, Mr .Niepce tried to represent on his plate the black produced by the absence of light in a hollow tube. But the hole produced no effect, or rather it was negative, which is not the case when the black of natural objects, represented in a colored picture reflects its own tint, or, if we may say so, its own rays—endowed, it would appear, like all the others, with chemical action, for the apparent reason that the hole could not reflect any rays, and its blackness is the result only of the absence of all rays. The same thing may be said of the white, but less extraordinarily; for the white being the result of all the rays of light united, it may be more easily understood that the chemical action of the white would be the compound result of the various rays of which it is composed, and that result is the same as that which gives us the sensation of white. Certainly the reproduction of black and white by M. Niepce de St. Victor is a most extraordinary fact unfolded by his beautiful discovery, and perhaps more surprising than the reproduction of all the colors themselves.

It is not possible at present to foresee all the consequences of the researches of M. Neipce de St. Victor. It may be the seed that in the field of science will, by proper cultivation, grow into a gigantic tree, from which time will probably reap the most nutritious and wonderful fruits.—*British Journal of Photography.*

Editorial Summary.

THE GEYSERS OF NEVADA.—About twenty miles from Carson City, Nevada, are some remarkable mineral springs called Steamboat Springs, from the noise they make, which sounds like several steamers discharging steam. These springs cover an area of about three acres. The water is boiling hot, and the escaping steam can be seen for several miles before sunrise, and the atmosphere in the vicinity is filled with the smell of sulphur. There are crevices in the rocks where the water can be seen boilimg at a depth of thirty feet. There is also a spring which is called Breathing Spring. It is shaped much like a well. The water recedes to the depth of ten or twelve feet, and remains calm for five minutes, and then commences to boil, and rises until it shoots into the air above ten feet, and in five minutes it begins to recede.—*Ex.*

BLEACHING PROCESS OF MOTHAY AND ROUSSEAU.—The article to be bleached is immersed in a solution of permanganate of soda, which has been rendered slightly acid, and is stirred about for a few minutes, with a glass rod. It is then plunged into a solution of sulphurous acid, which removes the violet brown oxide of manganese deposited upon it in the first bath. After the successive immersions in the two fluids have been repeated two or three times it is found to be beautifully white, without its fibers being the least impaired in strength. In this, as in all the processes which have been used for bleaching, oxygen is the agent which destroys the coloring matters; but is here applied in the form of ozone, which is disengaged from the permanganate by the organic matters.

THE LATEST METEORIC THEORY is that of M. Fonvielle who, on the supposition that innumerable meteoric bodies circulate throughout the interplanetary spaces, concludes that each planet in the course of ages, has hollowed for itself a path among those flying meteoric masses, attracting all within the reach of its gravitation; but from periodical inequalities in its orbit, it attracts at times other meteoric masses which had before escaped its attractive power. Le Verrier demonstrated many years ago, by mathematical calculation, the existence of several belts of such meteoric masses moving in orbits like the planets. This shows that the strained hypothesis of a path created and maintained by planetary revolution, is unnecessary. The paths are ready made.

THE NARCOTIC SPRAY ANAESTHETHIC wins great favor among dentists and surgeons, and promises to be a most beneficent substitute for the injurious and dangerous application of chloroform and nitrous oxide. The part to be operated on is subjected to a jet of the spray until cold enough to be insensible, the process involving but slight pain. Numerous practitioners in Europe and America report enthusiastically of the success of the agent and the harmless *sequelae* in all sorts of operations.

TURN-TABLE CASEMATES.—For working heavy guns in casemates, so as to obtain a range of fire in as many directions as possible, a novel system invented by Capt. Robt. F. Scott, R. N., is to be applied on H. M. S. *Hercules*. A turn-table similar in effect to that used for locomotives is made to carry the whole weight of the gun, when required, and is laid with a segment of the curved track or way upon which the gun is swung. A number of these curved ways, each radial to the turn-table, are adjusted so as to carry the gun into the various positions desired, to either side of the casemate, pointing forward, aft, etc. By adjusting the turn-table track to either of these ways, the gun is swung on or off that particular track, and its whole direction changed.

MORE "SOCIAL SCIENCE."—M. Jean Dollfus, a large manufacturer in France, finding upon investigation that the women employed in his factories lost 40 per cent of their children in the first year, whereas the average mortality at that age in France is only 18, determined, with a princely philanthropy, to go to the root of the evil by paying every recent mother six weeks' wages, without work. The result has been the reduction of infant mortality in the district from 40 to 25 per cent in three years. Other manufacturers have introduced a similar plan, by inducing the employees to contribute to a fund. The subject is of importance everywhere, and some provision of the kind is demanded by humanity both for mothers and children.

EARTHQUAKE.—Two shocks were felt at Fort Klamath, Oregon, on the 8th of January, with an interval of half an hour. The first was slight, but the second was violent, lasting two or three minutes and breaking all the glass at the post. The tall pines around the fort, says an eye witness, seemed lashing themselves into fury. The wagons in front of the stable were engaged in a pitch battle; horses and cattle lying crouched upon the ground, uttering most pitiful moans. The sutler's store was thrown about 20 feet from its former position. It is supposed that a volcano had broken loose near the Klamath marsh, as a continuous dark volume of smoke is seen ascending in that direction.

LOWER CALIFORNIA.—The geological and topographical survey of the peninsula by J. Ross Browne, for the Lower California Land Company of New York, will soon be commenced; the party being probably on the ground ere this. Mr. Browne proposes to visit the shores and islands, with a view to determining upon a suitable location for the nucleus of a colony, as well as to make an examination of the products and resources, including gold, silver, copper and other mines, fisheries, pearls, salt beds, fruit, wine, guano, etc. There is little doubt that this great domain will in no long period become a part of the United States.

SPONTANEOUS COMBUSTION.—Some of the penalties which Nature inflicts upon vice of different kinds, are as horrible as anything ever imagined of infernal retributions. A well-authenticated case of spontaneous combustion occurred in Columbus, Ind., on the 15th ult. Andrew Nolte, a German, very intemperate in his habits, was found dead in his shop, his lips entirely burned away, leaving a ghastly hole, his tongue charred to a crisp. His nose was also burned, as if by fire coming out of his nostrils, and his clothes were still burning when found. No other part of his body save the air passages was burned.

IS NITRO-GLYCERIN POISONOUS?—An inquiring German has been trying nitro-glycerin internally, not for blasting, but to ascertain whether it is poisonous. In large doses it caused death in animals, acting chiefly on the brain. The experimenter, getting accidentally more than he meant to, suffered pretty severely from headache, giddiness and partial loss of consciousness, but experienced no very alarming symptoms. Externally, it produced no effect whatever. Hence he concluded that it is a safe article to handle, so long as it does not explode.

FRUIT TREES, says a correspondent, should be allowed to shoot out their branches near the ground, protecting the trunk and the soil from changes of temperature and loss of moisture. He thinks that Providence never meant fruit to grow out of reach. He is right. We have seen the experiment tried, and it has been found that apple trees, especially, bear better when the top branches are cut away, and the limbs permitted to grow lower down on the trunk.

A NEW MODIFICATION OF PHOTOGRAPHY.—It has been suggested that the interior and exterior parts of complex objects, such as an instrument or a bodily organ, may be represented in their actual positions, by first photographing the exterior part, and before the image has been strongly impressed, substituting upon the camera the inner part. The latter will appear in the picture as behind or inclosed in a transparent image of the former.

IF the current of sparks of an induction coil be passed through the luminous flame of gas or of a candle, no alteration is seen in the flame, excepting that in the path of the sparks the flame is intensely luminous. If, however the flame be examined by means of the rotating mirror, it is found that the flame is always extinguished above during the passage of an individual spark. The part below the spark is constant and steady.

DISTILLATION OF PERFUMES.—It has recently been discovered in France that sulphuret of carbon is the best solvent of the essential oils of flowers. The sulphuret penetrates into the substance of the petals, expels the water, and when charged sufficiently with the essential oil, is evaporated.

ELECTRIC "FLUID" OR ELECTRIC FORCE?—The later discussions tend toward the theory that a conductor of electricity is a medium for the transmission of a force or effect, rather than a channel for the locomotion of an agent. In this direction there is a chance for discovering the physical properties which render conducting substances susceptible to electric force, and those which disqualify others.

NOT PATENTABLE.—An ingenious if not practical person lately applied (*not* through the Scientific American Agency) for a patent on an invention designed to render spirits palpable to the senses, by means of some fancied attenuation of light and air in a closed room. The commissioner couldn't see it.

THE GREAT LAKES.—The elevation of the surface of Lake Superior above the sea is six hundred feet, that of the other upper lakes 578 feet, yet their great depth places their beds except that of Lake Erie, below the surface of the ocean. These immense reservoirs, Lake Ontario included, contain nearly one half of the known fresh water on the globe.

THE costliest watch that was ever made is said to have been one which was constructed in 1844 for the Sultan Abdul Medjid, who must have found it rather inconvenient, since it was five inches in diameter, and struck the hours and quarters on wires, with a sound resembling that of a powerful cathedral clock. It cost 1,200 guineas.

THE AIR TREATMENT.—M. Boisson has introduced a method of treating superficial wounds by a jet of air from the common bellows, immediately forming a dried film over the exposed flesh, beneath which healing is greatly facilitated and other obvious advantages secured. Burns which have removed the skin may be treated advantageously in this way.

SHEEP WASHING.—Great pains are taken in cleansing wool before shearing in Germany. In Hungary the sheep are first soaked and rubbed in vats of very warm water with potash. After cooling, they are showered as forcibly as possible with cool water until the wool is white, and are then kept in a clean and warm shelter until dry for shearing.

THE quantity of atmospheric electricity at noon, is much greater in winter than in summer, the relation being about ten to one. This augmentation of electric force proceeds in a manner almost parallel with the number of days of frost or fog, and inversely as the number of days of thunder, elevation of temperature, and actinic power.

M. QUETELET says that careful observations have convinced him that a plant developes much more rapidly during a mean temperature, when this temperature varies, then when it is uniform, provided that it does not fall below freezing point. He is also of opinion that the effect produced is equal to the square of the temperature.

CHARCOAL has been tried in fattening fowls, with marked advantage: the difference in weight produced, amounting to fifteen or twenty per cent, besides a decided advantage in tenderness and flavor. The charcoal was pulverized and mixed with the food, about a gill daily to one turkey, and also left free on the ground.

IMPROVED STEEL MASTS.—This is the latest application of the Bessemer product: substituting much lighter and slenderer tubes of steel, for the wrought iron article which had already been applied to some extent in the British navy in place of "sticks." The new mast is strengthened by transverse longitudinal plates.

M. GANZ, of Ofen, in Hungary, coats the interior of his molds, which should be of iron, with a paste of finely-powdered antimony and alcohol and then dries them at a temperature of 100 deg. cent. The iron castings are thus covered with an extremely hard coating of the alloy of antimony and iron.

SUBMARINE PHOTOGRAPHY.—M. Bazin has obtained clear submarine photograms at a depth of 300 feet, in his diving studio, by means of the electric light thrown through watertight lens windows upon the objects to be photographed. The value of this invention in submarine surveying is obvious.

AS a result of the late strike in the iron trade, a scheme has been started at Darlington, which appears to have the sanction of the iron-workers of the district, and is principally under their management, to erect rolling mills on the co-operative principle.

THE *Orontes*, iron troop-ship, which is paid over below the water line with the Admiralty, or Hay's, anti-fouling composition, and has been eight months out of dock, is found to be almost as clean on her bottom as when she left the dock.

ITALY VS. ENGLAND.—An Italian house has carried off an enormous contract for basin, docks, factories and other works connected with the enlargement of the Chatham (Eng.) dock yard, over the heads of the English bidders.

A MISSOURI blacksmith has prepared a horse shoe for the Paris Exhibition, made of raw ore from Iron Mountain. Half the shoe is finished, and the other half shows the ore as it is dug from the mine.

THE FAMINE IN INDIA.—1,000,000 people, or one sixth of the population, have been destroyed by the great famine of 1866 in an area of country not larger than England and Wales.

THE LARGEST ROOF IN THE WORLD is at St. Petersburg. It is a single arch of iron, covering a room 650 by 150 feet, which is used for military purposes, balls, etc.

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IMPROVED SLATE IRON FOR CARRIAGE TOPS.

In covering the exposed portion of the bows of a top carriage it is necessary with the slat irons in common use to attach a mitt or cap at the bottom. This is only a manner of concealing an imperfectly finished job, which when the work is done by hand is usually avoided by good workmen. Carriage work, however, is now largely done by machinery, the leather stitching especially, and while straight work done on the machine is neater than the usual hand work it is not relied upon for such jobs as covering bow irons.

The engraving shows an improved bow iron which allows the slat or bow to be removed to receive its cover. In the engraving the two outside slats are covered. A represents one showing the side to which the iron is attached. B is partly in section, showing the screw by which the slat is attached to the pivoted end of the iron. The bows being fitted for the trimmer, he takes them, cuts out the covering, bastes it on the bow, then slips it off and runs it through the sewing machine.

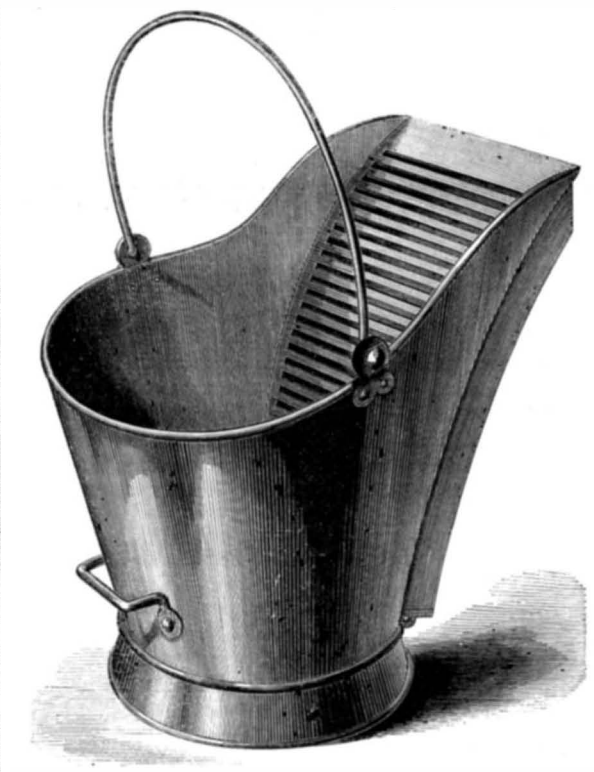
It is then drawn back on the bow and the bow screwed on the jointed part. The job when finished is perfect and has a very neat appearance, considered superior to that of those covered in the ordinary way. Every carriage maker or trimmer will easily understand the advantages of this method of covering. It was patented through the Scientific American Patent Agency, Oct. 30, 1866, and is said to give excellent satisfaction in use. Address for further information A. M. Decker, Glenn's Falls, N. Y.

The Employment of Acid in the Making of Sugar.

During the last three years acids have been largely employed in the manufacture of beet-root sugar in France, and within two years several sugar houses have been specially arranged for the acid process. M. Kessler Desvignes has recently communicated to the Paris Academy of Sciences the results of this new method. The defecating action of sulphuric acid on beet-root juice is well known. When acid of 66° is added to juice of ordinary density, an abundant precipitate is thrown down, and is continued by subsequent additions of acid until it reaches to 2½ millionth parts of the whole weight of the juice. Most of the acids produce the same effect in different doses, but the separation of the deposit is more or less complete in proportion to the energy of the acid. When heat is applied, the precipitate rises to the surface, and is easily got rid of by skimming. Such was the mode originally adopted when sugar was first made in France, but it had to be given up because the defecation was not complete, and also because it injured the crystallization of the sugar. M. Desvignes imagined, however, that it might be advantageously reintroduced with modifications, and having achieved considerable success, he thus explains his process:—1st. Acids employed at the ordinary temperature, even in large doses, do not affect the sugar, and therefore it is only necessary that they should be saturated by a base before heat is applied. 2nd. On the other hand, acids arrest viscous fermentation, and doubtless the effects of other ferments also; they act as powerful antiseptics, and thus prevent the formation of the glareous substance which seems to be one of the gravest causes of bad sugar making, and, on the other hand, they prevent the destruction of the sugar by the ferments with which it is brought into contact when the cells of the beet root have been broken by rasping; and this destruction, M. Desvignes believes, is far more rapid and more considerable than is generally believed. The antiseptic effect may be easily exhibited by taking pure juice and mixing it with other juice which has become glareous to the extent of 5 per cent, then separating it into two parts, and treating one of these with from 2½ to 3 thousandth parts of its weight of sulphuric acid at 66°. On the following day it will be found that the juice which has not been acidified will have become cloudy and viscous, while the other will remain clear, with the deposit caused by defecation at the bottom. M. Desvignes gives the details of his experiments with non-acidified glareous juice, proving the loss in sugar caused by the viscous change, and draws the conclusion that, contrary to generally accepted opinions, acids, instead of having an injurious effect on sugar in cold juice, preserve it, on the contrary, from the destructive effects of fermentation. The same experiments applied to beet-root juice kept for a longer time exhibit the same effects to a still more remarkable extent. 3rd. It is easy to prevent all danger or inconvenience by choice of acids; fluorhydric, hydrofluosilicic, and phosphoric acids, as well as many of their combinations—such as the fluosilicate of magnesia, which is easily obtained in a crystallized form—the fluosilicates of alumina and manganese, the biphosphates of lime, magnesia, or alumina; the phosphate of lime dissolved, or attacked by fluorhydric acid, hydrofluosilicic, hydrochloric, or nitric acid, never produce callosity, and may be used without the slightest ill effect, either as regards the workmen or the pulp. 4th. Defecation by acids is easily completed by the precipitation of certain substances more or less basal, such as magnesia, the silicates and aluminates of lime, the compounds of starchy matter with that base, the insoluble phosphates, the fluoride of magnesium, calcium, and aluminum, etc., and the above named acids easily bring about such deposition. It is only necessary to saturate them with lime, or to dissolve previously in the acidulated juice some of the bases which it is desired to precipitate. Thus a kind of analysis on a large scale is carried on in the manufacture, separating, in the first place, the insoluble organic acids by means of those which are added; and afterwards, the soluble acids with the neutral or basal compounds liable to form with the lime and magnesia compounds difficult of solution. One of the advantages claimed for the system in question is that of effecting very complete defecation with an excess of lime, so that the juice may be immediately evaporated and boiled without the necessity of using charcoal. Thus, we find in acids powerful antiseptics, possessing this advantage over lime—that they may be added to the pulp without danger to cattle, preserving the sugar against fermentation, and yielding in one operation, instead of two, perfectly defecated juice, which, by the addition of a simple solution of lime, yields as much crystallizable sugar as if it had been passed through charcoal.—*The Grocer.*

COMBINED COAL HOD AND ASH SIFTER.

Nothing can be neater or handier than the improved coal hod herewith illustrated. It is at once a receptacle for the fuel and ashes and a sifter of both. Its construction shows an eye to proportions as well as an object of utility. The hod is in the usual form, the discharging surface being perforated either with transverse slits arranged diagonally to retard the escape of the debris as may be desired. In front is a channel formed of a bent sheet of iron and having at the bottom a hinged door to let out the ashes or dust. It shows for itself



that it has great advantages over the ordinary hod and will recommend itself to all housewives. Its cost of construction cannot be much greater than that of the ordinary hod, while its advantages must be obvious.

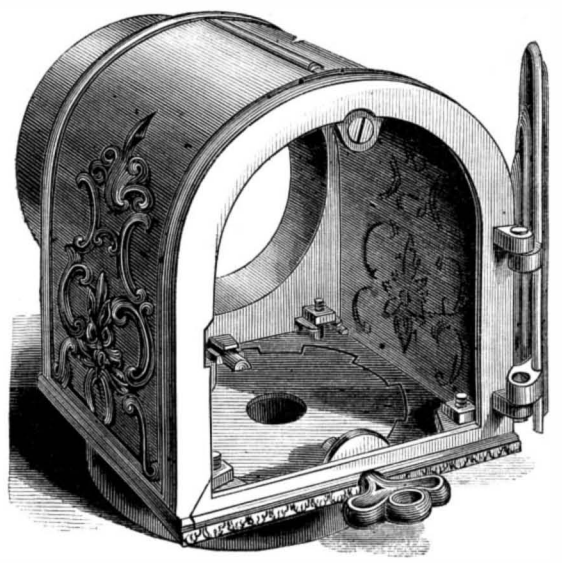
This hod is the subject of a patent issued in favor of Yateman and Mason, Washington, D. C., Jan. 15, 1867. For further particulars address Alexander & Mason, cor. 7th and F streets, Washington, D. C.

Philadelphia Butter.

The editor of the *Practical Farmer* has been investigating the source of the excellence of this celebrated product. He finds that with the model dairyman butter-making is a matter of business, and all the minutiæ receive his personal attention. The quality appears to depend on a number of very important though minute processes. Butter made from sweet cream will not keep well, and until the milk sours all the cream cannot be obtained, while if left longer rancidity ensues. A small quantity of sour milk is therefore put into each pan to hasten this process, unless the weather is such that the souring of the milk takes place within the thirty-six hours which are considered the proper time for the milk to stand before being skimmed. The skimming must be done exactly at the right time. The temperature, 62°, is regulated by a thermometer. The cream vessels are kept in water at a low temperature, and regularly twice a day are stirred thoroughly with a wooden spatula. At churning time these cream pots are plunged into a boiler of hot water, and stirred rapidly with a stick, till the temperature reaches 60°, when they are immediately emptied into the churn. When the butter begins to break a quantity of cold water is poured in, which tends to harden it and cause a more thorough separation of the buttermilk. This is then drawn off and more water thrown in, to wash out any still remaining. After working and seasoning, the butter is laid in water on a clean cloth for a couple of hours, when it is worked over again and finally prepared for market.

WILSON'S COMBINED FUNNEL ELBOW AND DAMPER.

In some parts of the country bituminous coal is largely used for cooking as well as for heating purposes. Much of the volatile constituents of this fuel is unconsumed, and being delayed in its escape to the outer air, is deposited in the funnel of the stove. With the ordinary stove-pipe no other remedy is possible except to take down the pipe at not unfrequent intervals and clean it. The lodgement of these particles of unconsumed carbon is generally in the horizontal portions of the pipe, especially where the upright joins. The device shown in the engraving is an ornamental elbow, easily acces-



sible, by opening which the debris may be drawn or swept out.

The bottom and ends are of cast-iron, and the cover or upper part may be of the same substance or of sheet-iron as preferred. A flange at the bottom receives the vertical pipe, and a similar flange at one end of the contrivance, the horizontal length. Opposite this latter opening is a door, represented open in the engraving, by which the interior may be reached. A damper, either rotating, as shown in the engraving, or a slide, forms the bottom of the elbow. In either case it has an aperture sufficiently large when the damper is closed to allow the escape of deleterious gases into the chimney. The damper, which forms a plate or floor for the reception of the deposit is also useful as a damper, as by it the combustion of the fuel can be easily regulated and controlled.

These elbows are made of all sizes—fitted to all ordinary pipes—and are but slightly more costly than the ordinary funnel elbow. In addition this is ornamental as well as useful, and does away with the annoyance of new elbows where a change of residence becomes necessary. It can be hinged at the turn of the pipe to aid in the adjustment of the funnel, and is made in this style so as to suit all circumstances. Wilson and Wood, Wilmington, Del., are the proprietors of the patent, which was granted through the Scientific American Patent Agency, Dec. 11, 1866, and to them all communications should be addressed.

THE CANNON KING.

[Translated for the Scientific American from the Leipsic *Gartenlaube.*]

Just after the war between the two great German powers was over, the European as well as American journals entertained their readers with descriptions of the inventor of the Prussian needle gun and of the arm itself, and it seems only justice to give our readers a description of the immense manufactory of that man whose genius gave the Prussian artillery an arm of no less importance than that of the infantry. Mr. Alfred Krupp's far-famed establishment is in an exceedingly favorable situation, at the junction of three grand railways of western Germany, about two hours from Cologne, in the direction of Berlin. Here in Essen, Krupp inherited, as a boy of fourteen, a small workshop for manufacturing cutting engines. By ability, energy and good luck he enlarged his workshop gradually, so that in 1865 he manufactured, by the aid of 160 steam engines, 39 steam hammers, and 400 melting, glow and cement furnaces, no less than 1,000,000 cwt. of cast steel, one third for cannon and the rest in large bars for steam engines, axles, wheels, boilers, etc., etc.

Krupp's first steel cannon were cast in 1849 and offered to the chief German governments, but refused by them because they thought the article too novel and costly. The Viceroy of Egypt was the first who ordered them. (Our readers will remember that Mr. Dreyse's offer of his needle gun was also refused at first for a similar reason.) Since that time nearly all the great powers of the civilized world have ordered Krupp's cannon. Russia is going to alter her cannon to steel in her manufactory at Alexandroffsky, expressly erected for this purpose. Prussia buys steel cannon, which are cast at Essen and rifled at the fortress of Spandau: she has, however, her own system of breech loading, which is different from Mr. Krupp's. Belgium and some smaller states have accepted Krupp's system, or still partly use the Prussian arm. The Austrian and Dutch navies are partly supplied with steel cannon. The Italians have bought some six-inch breech-loading guns. Krupp's best customers, however, until lately, were the Turks,

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who have bought no less than 200 six-pounders, and the Japanese, who, on their trip through Europe two years ago, ordered at once 60 six-inch cannon, 30 of which were delivered in September last. Mr. Krupp's establishment has delivered 2,500 cannon of steel, mostly rifled breech loaders, 400 of which have a caliber of eight inches and more, the rest having from three to four and a half inches.

The workshops of Krupp cover at present over 500 acres of land, consume daily 15,000 cwt. of coal, work by steam from 120 boilers, are illuminated by 7,000 gas lights, and employ over 8,000 men and boys, whose wages amount to about 2,500,000 dollars, or an average of 312½ dollars each per annum. A fund has been established to which every workman has to contribute an average of one groschen (about three cents) of every dollar he earns, in return for which he receives support in case of sickness, and a good pension in his age. Mr. Krupp himself contributes to this fund half as much as his workmen: so that in fact, if a workman pays for instance $1, the fund gets $1·50. From this source every workman gets, after twenty-five years service, a good pension. In case of accident, he receives full wages during the whole time of inability to work, and if sick he is supplied with medicines, and finally, burial expenses are usually paid out of this fund. Besides this, Mr. Krupp's workmen enjoy a good many other advantages. To supply them constantly with good and cheap bread, he erected bakeries in a grand style, the flour for which he buys in large quantities from Russia. Similar arrangements have been made to supply them with good and cheap potatoes, and we hear that Mr. Krupp intends to do the same with meat. These father-like arrangements prove very beneficent for both employer and workman, and have been imitated in England in many of the large manufactories.

The iron ores for the enormous demand are partly from Krupp's own mines in the late dukedom of Nassau, and near Coblentz, and are partly bought. The former give the well-known Spiegel iron. It contains a large quantity of manganese, of which, however, it is cleaned by a simple process, and contains then over 98 per cent of pure iron, the other two per cent consisting mostly of silicious earth, cobalt, nickel, copper, and a very small quantity of phosphorus. That which is to be used for cannon must be softer than ordinary steel, so as to have a certain elasticity under the force of the discharge. This softness is attained by mixing a quantity of forge iron in the steel mass. Iron and steel are cut into bars of six inches length and put in plumbago crucibles containing from thirty to sixty pounds each. The manufacture of these Krupp crucibles was a secret for a long time. At present, however, those of Ruel in London, and the Patent Crucible Company, Battersea, are deemed to be almost as good. The foundery is an enormous building, containing so many furnaces that the necessary iron and steel masses for castings of the largest dimensions can be melted there in 1,200 crucibles at the same time. About ten crucibles are placed in every furnace, resting on movable bars. The heat in the furnaces is so great that the best Scotch fire-proof stones which surround them, and sometimes even the crucibles, melt, so that the latter can be used but once. The workmen are divided into companies, and obey commands with the greatest precision, so as to be able to found the contents of the different crucibles all at once into a reservoir and thence into the mold beneath. As soon as the casting is solid it is surrounded by hot ashes and kept in a red glow until the forging takes place. As this can only be done in cool weather, the largest pieces sometimes lie two or three months in their hot beds, the necessary temperature being maintained by constant supplies of glowing ashes.

The castings consist first of round or square forms, and are afterwards forged, hammered or turned. By the regular form of the casting, a symmetrical mass is obtained, free of bubbles; the steam hammer gives the mass the necessary compactness, strength and elasticity, and generally compresses it 2 or 3 per cent, and the power of resistance rises from 760 to 1,320 cwt. per square inch. The last mass for the cannon is pretty soft and has a power of resistance from 800 to 900 cwt.

The smaller cannon consist of one solid piece: those over eight inches caliber are compound, and fastened by rings. The largest *steel* cannon yet manufactured is of eleven inches caliber. It was first cast as a cylinder of 750 hundred weight and seven feet diameter, and then forged, after which it was strengthened by rings of cast steel. Two monsters of this kind, weighing 540 cwt. each, and worth about 14,000 thalers, have been manufactured for the Russian government They are breech-loaders, and are able to throw a ball of 540 pounds with a charge of 50 pounds of gunpowder. Their destination is the Russian fortress of Kronstadt. A still larger monster of 15-inch caliber, throwing balls of 900 lbs., for the same government, will be at the grand exhibition.

The steam hammers are of great importance in Krupp's establishment. The largest of this kind has a fall of ten feet and cost about 700,000 dollars, two thirds of which were paid for the tilter or bed of the hammer, which has not sunk in the least, although the hammer has been thundering day and night. We should say that nothing could resist the power of these blows, but the large masses of red glowing steel it has often to forge bear these blows with so much resistance that they become effective only by long repeating. Mr. Krupp has therefore decided to use a three times greater power upon his steel, and to forge a hammer of 2,400 cwt. with a fall of thirteen feet. The cost thereof will be about 1,300,000 dollars.

Steel cannon were until lately the principal manufactures of Krupp, but lately he has also manufactured a good many balls and bombs for the Russian government, to which he has delivered several thousands of oblong eight and nine inch shot and shell, all the finest cast steel, the smaller sort of which contain eight pounds of powder and are able to crush iron plates five and a half inches thick. But every one of these pills costs over 100 dollars, all being hammered and forged. Similar though smaller bombs are destined for the Italians, and partly already delivered.

THE MECHANICAL EQUIVALENT OF HEAT.

Prepared for the Scientific American.

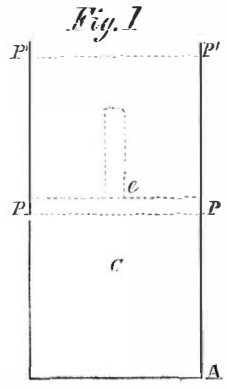
Our present mechanical equivalent of heat is established by proofs of such seeming strength and conclusiveness that it is no light matter to call its truth in question; however, I propose to show that these proofs are not really so conclusive as they appear and that our equivalent, which says a unit of heat will give 772 foot lbs. of force, has no direct proof for its support but the all direct proof which can at the present time be brought to bear on the subject would go to establish quite a different measure for the power of heat. I will first quote from "Heat considered as a mode of motion," by Professor Tyndall, to show how the equivalent has been established and will then present the reasons for making the above statement.

"Using the accurate numbers, the quantity of heat applied when the volume is constant, is to the quantity applied when the pressure is constant, in the proportion of 1 to 1·421.

"This extremely important fact constitutes the basis from which the mechanical equivalent of heat was first calculated. And here we have reached a point which is worthy of, and which will demand, your entire attention. I will endeavor to make this calculation before you.

"Let C, (in Fig. 1,) be a cylindrical vessel with a base one square foot in area. Let P,P, mark the upper surface of a cubic foot of air at a temperature of 32° Fah. The hight A P will then be one foot. Let the air be heated till this volume is doubled; to effect this it must, as before explained be raised 490° Fah. in temperature; and, when expanded, its upper surface will stand at P′ P′, one foot above its initial position. But in rising from P P to P′ P′ it has forced back the atmosphere, which exerts a pressure of 15 lbs. on every square inch of its upper surface, in other words, it has lifted a weight of 144×15=2,160 lbs. to a hight of one foot.

Fig. 1



The "capacity" for heat of the air thus expanding is 0·24 water being unity. The weight of our cubic foot of air is 1·29 ounces, hence the quantity of heat required to raise 1·29 ounces of air 490° Fah., would raise a little less than one-fourth of that weight of water 490° The exact quantity of water equivalent to our 1·29 oz. of air is 1·29×0·24=0·31 oz.

"But 0·31 oz. of water, heated to 490° is equal to 152 oz., or 9½ lbs. heated 1° Thus the heat imparted to our cubic foot of air, in order to double its volume and enable it to lift a weight of 2,160 lbs., one foot high, would be competent to raise 9½ lbs. of water 1° in temperature.

"The air has here been heated under a constant pressure, and we have learned, that the quantity of heat necessary to raise the temperature of a gas under constant pressure a certain number of degrees, is to that required to raise the gas to the same temperature when its volume is kept constant, in the proportion of 1·42 : 1 hence we have the statement—

Lbs. Lbs.
1·42 : 1—9·5 ; 6·7

which shows that the quantity of heat necessary to augment the temperature of our cubic foot of air, at constant volume, 490°, would heat 6·7 lbs. of water 1°.

"Deducting 6·7 lbs. from 9·5 lbs., we find that the excess of heat imparted to the air in the case where it is permitted to expand, is competent to raise 2·8 lbs. of water 1° in temperature.

"As explained already, this excess is employed to lift the weight of 2,160 lbs. one foot high. Dividing 2,160 by 2·8, we find that a quantity of heat sufficient to raise one pound of water 1° Fah. in temperature, is competent to raise a weight of 771·4 lbs. a foot high.

"This method of calculating the mechanical equivalent of heat was followed by Dr. Mayer, a physician in Heilbron, Germany, in the spring of 1842.

"In August 21, 1843, Mr. Joule communicated a paper to the British Association, then meeting at Cork and in the third part of this paper he describes a series of experiments on magneto-electricity, executed with a view to determine the "mechanical value of heat." The results of this elaborate investigation gave the following weights raised one foot high, as equivalent to the warming of 1 lb. of water 1° Fah.

1.	896 lbs.	5.	1026 lbs.
2.	1001 lbs.	6.	587 lbs.
3.	1040 lbs.	7.	742 lbs.
4.	910 lbs.	8.	860 lbs.

"In 1844 Mr. Joule deduced from experiments on the condensation of air the following equivalents to 1 lb. of water heated 1° Fah.

823 foot lbs.
795 foot lbs.
820 foot lbs.
814 foot lbs.
760 foot lbs.

"As the experience of the experimenter increased, we find that the coincidence of his results become closer. In 1845, Mr. Joule deduced from experiments with water, agitated by a paddle wheel, an equivalent of

890 foot lbs.

"Running up his results in 1845, and taking the mean, he found the equivalent to be

817 foot lbs.

"In 1847, he found the mean of two experiments to give as an equivalent

781·8 foot lbs.

"Finally, in 1849 applying all the precautions suggested by seven years experience, he obtained the following numbers for the mechanical equivalent of heat:—

772·692, from friction of water, mean of 40 experiments
774·083, from friction of mercury, mean of 50 experiments
774·987, from friction of cast-iron, mean of 20 experiments

For reasons assigned in his paper, Mr. Joule fixes the exact equivalent of heat at 772 foot lbs.

"According to the method pursued by Mayer, in 1842, the mechanical equivalent of heat is

771·4 foot lbs.

"Such a coincidence relieves the mind of every shade of uncertainty, regarding the correctness of our present mechanical equivalent of heat."

This subject will be completed in another article.

CURIOSITIES OF COMBUSTION.

BY PROFESSOR CHARLES A. SEELY.

"Combustion is the disengagement of heat and light which accompanies chemical combination." This is a very good definition, the best one I remember to have seen. I intend this as a high compliment for I have observed that school-book definitions often need more explanation than the thing defined. It is a very interesting and profitable mental exercise, to discover the heterogeneous things that a definition owing to its inaccuraey of language, is obliged to cover. Any book on the physical sciences will furnish good material. It is a very ancient amusement. Plato once defined man to be a "two-legged animal without feathers," a definition of man about as precise as ever was made. But Diogenes plucked a goose, and throwing it into the Academy, exclaimed, "Plato, behold your man." So I might bring phosphorus and rotten wood which shine in the dark and to a delicate thermometer exhibit heat, as cases of combustion. But Dr. Ure, the author of the definition, might very aptly retort, as did the preacher whose sermon was criticised, "better it if you can." And I should be forced to reply, "I cannot unless you allow me to use a great many more words."

The combustion with which we are most familiar is that where oxygen is one of the elements concerned. A very interesting peculiarity of this ordinary combustion is the fact that its beginning requires a high temperature. We consider coal, wood, oil, sulphur, and gunpowder very combustible, but there is no combustion, although oxygen be present, until they be set on fire or ignited, that is, until some portion be heated up to a high temperature. Oxygen is very different from other supporters of combustion in this respect, for with them combustion begins at ordinary temperatures. If suddenly chlorine were put in the air in place of oxygen, or if the oxygen should assume its active form known as ozone, every thing combustible upon the earth would take fire and be consumed with fervent heat in a few hours. This property of oxygen, to which I allude, is another of the striking evidences of the adorable Wisdom everywhere to be found in the order of nature.

The temperature of ignition varies greatly for the different combustibles. Phosphorus, sulphur, and sodium take fire below a red heat, while the ignition point with others is so high that we rarely have an opportunity to see them burn. The combustible nature of iron, lead, copper, silver, and gold, was not even suspected until a recent period. We know now that they burn even more readily and fiercely than any common fire, when once they are kindled; if I wanted to make the most gorgeous pyrotechnic display I would make a bonfire in which I would burn up a few tuns of iron. The ignition temperatures have been determined for only a few substances. Here is useful work to be commended to the rising generation of chemists. The facts ought to be determined and put into the form of a table.

The philosophy of spontaneous combustion is now well determined and can be made plain to everyone. Heat is always a product of oxidation, or in other words, heat always accompanies the union of oxygen with another substance. The amount of heat produced is, moreover, exactly proportioned to the amount of oxidation. If a day or a year be employed in burning (oxidizing) a pound of coal the amount of heat in the two cases is precisely the same. The rapidity of burning has nothing to do with quantity of heat; it is a question of intensity, quite another thing. The pound of coal burning in a minute gives an intense heat and consequently light, but let that heat be distributed over the space of a year, and it would require an instrument far more delicate than our senses to detect that which would appear in a second or a day. In slow burning or oxidation the heat is simply diluted in time or space. Let a child's supply of candy be divided and administered constantly, and in the homeopathic doses he would never suspect that candy had any taste.

The rust which is produced from a pound of iron indicates or represents an amount of heat sufficient to raise nearly 3,000 pounds of water 1° Fah; that is such a quantity of heat was produced by the rusting or oxidation. As the specific heat of iron is one-ninth (nearly) that of water, this quantity of heat is sufficient to raise the temperature of one pound of iron to the temperature of 27,000°, or nine pounds to 3,000° which last is without doubt above the ignition point of iron. Suppose the heat of rusting be retained in the rust. Would not we have a spontaneous combustion which would be fearful even to think of!

In ordinary oxidation the heat leaks away by radiation and conduction as fast as it is generated. Let us see how we may retain it. As oxidation takes place only at the surface it is plain that its rapidity will be increased just as we increase

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the surface. Thus, a pound of iron extended so as to have double the surface will be rusted in half the time, with one-hundredth the surface in one-hundredth the time. Suppose the pound of iron to be originally in the form of a ball and that we divide it successively into balls smaller and smaller. The surfaces of balls are to each other as the squares of their diameters, while their weights are as the cubes of their diameters, and the ratio of the surfaces to the weights is constantly increasing as the division goes on. It is evident that by so dividing and increasing the surface a point might be reached where the heat would be generated by oxidation more rapidly than it could leak away, and that thus the ignition temperature would be reached, when combustion would ensue.

This is no speculation. I can prove the facts by actual experiments, dividing the iron and exhibiting it taking fire, with far less labor than I have put on this article. Prussian blue is a compound of iron, nitrogen, and carbon. If it be heated to a bright red heat in a tube or crucible from which the air is excluded, till fumes cease to be evolved, the iron is left finely divided. When the apparatus is cool the iron may be taken out and on exposure to the air it will immediately take fire. Ordinary lead is not easily set on fire. But get it in fine powder! Fill a small vial with tartrate of lead, fit in a clay stopper, set the vial in a sand crucible, imbedding the vial in sand, and subject the whole to a low red heat for half an hour. The vial now contains lead powder, the particles of which are prevented melting together by other fine particles of carbon. This lead powder takes fire as soon as it is brought into the atmosphere. Dissolve phosphorus in bi-sulphide of carbon, and dip a piece of cloth or paper in the solution and expose it to the air. Instantly as the solvent has evaporated, the phosphorus (now left finely divided) takes fire. I might describe hundreds of similar experimental illustrations, but I hasten to the cases of spontaneous combustion which occur in the ordinary routine of life.

Ninety-nine hundredths of these cases originate from the oxidation of linseed oil. This oil in a paint pot has little surface exposed compared with its whole mass, and the heat generated is diluted over the whole body of the oil, radiates into the air, etc. When the paint is spread on wood, the oil oxidizes rapidly and heat is correspondingly produced but being in contact with the conducting wood it is carried away. But if the wood were a non-conductor and no heat were radiated the oil would speedily take fire. When the oil is mixed with sawdust or spread on cotton wool, paper, or clothing, and the mass is kept away from strong currents of air, spontaneous combustion ensues. A painter rolls up his greasy overalls in a bundle, throws them in a corner or on a shelf and the house is set on fire: dozens of cases like this have occurred in this city. Linseed oil is so remarkable in this way that I think it might sometimes be made available for kindling a fire where matches and other conveniences are not at hand.

The spontaneous combustion of nitro-glycerin, gun cotton and pyrotechnic compounds may be brought within the category of oxidation. But in all these cases the oxygen is not supplied from the air. It is part of the substance itself, and is gradually eliminated to the part which is combustible. A complete explanation of these cases would extend this article beyond reasonable limits.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Menhaden Oil Mania.

Messrs. Editors:—The time was once when those engaged in the manufacture of Menhaden oil were looked upon with disgust by those who considered themselves the "Upper Ten" of society. But now how great the change! Whether the exalted have become abased, or the abased exalted, deponent saith not, but certain it is that it has taken the form of a mania second only to the petroleum excitement. This business, which about fifteen years ago was in its infancy, has now become one of the "institutions" of our land and is not confined to our vicinity but is spreading north and south with astonishing rapidity, and the finny tribes are disturbed in their most secret haunts. While fifteen years ago there was but one factory in this vicinity, today there are perhaps twenty or more, and nearly all of them prospering, as we should think by the extensive preparations being made for the coming season. A novel plan has originated here, to follow the fish with the change of season. Two large steamers have been fitted with necessary apparatus for extracting the oil, and have cruised the past season from Maine to Virginia in search of the "miniature whale." This plan is attended with extra expense and difficulty and we think has hardly been profitable so far, but with proper care and more experience may yet be made remunerative. It certainly has the merit of originality and perseverance, and merits success. About three years since, a company from this place started a factory in the state of Maine. Since that time other companies hearing "fairy tales" of the success of the pioneer works, have located in that vicinity, and now they are nearly as numerous as here. We certainly wish them all success, but fear that the large number engaging in the business will eventually ruin it for all. But in this we may be mistaken. The oil as now made is used largely for outside painting and is considered by many superior to linseed. Forming a smooth glossy coat on the surface of the wood, and being sold at a much lower price than linseed, it is getting into general use. It is also used by rope-makers and curriers of leather, as it is much cheaper than other oils and answers their purpose as well. The refuse of the fish is considered an excellent fertilizer, and is used in large quantities on the Island, and also in Connecticut and Massachusetts. It is also an important component in the manufacture of phosphates, containing a large amount of ammonia, which is necessary to certain crops. But perhaps we have written enough on this subject, our object in writing this article being to enlighten your readers concerning a business of which comparatively little is known. A.

Greenport, L. I., Jan. 29, 1867.

Elongated Shot and Shell.

Messrs. Editors:—Capt. Norton, I observe by your paper of the 2nd inst., has furnished you with evidence relating to his claims of priority. The article states that one Richard Airey, Quarter-master General, had seen Capt. Norton's elongated expanding shot and shell, identical in principle with the present Minie bullet, at Woolwich, England, in 1823. The statement does not furnish us with the information required. If Captain Norton claims to be the first to propose the use of elongated projectiles, I refer him to Joe Hunter's French patent dated 1790, wherein he fully describes his compound shot and sabot for rifle guns. A drawing of Hunter's sabot in my possession represents it as formed on a conical based shot like "Sawyers." Dr. Reed's patent is dated 1756 and consists of the application of expanding sabots to elongated projectiles, but he casts the projectile on the sabot. In practice it is found to be very destructive to guns and projectiles, and it is now abandoned.

Major, now Major General, Dyer, in the spring of 1859, proposed to the Ordnance Department the application of expanding soft metal sabots to the base of projectiles, being the converse of Dr. Reed's patent.

Mr. Thomas Taylor, of Washington Arsenal, claims to be the first to render the Dyer system practical. The advantages of Mr Taylor's improvement are of much importance Shot and shell may now be fired over the heads of troops without danger, as the sabot never strips. Brig.-Gen. John Gibbons says—page 120, Artillerist's Manual, 1863—"the importance of applying the rifle principle to guns of large calibre is too evident to need explanation, and many and various have been the attempts made to succeed in it, but up to the present without any degree of certainty, although much progress has been made. The importance of the question is much enhanced by the fact that the moment a successful plan is discovered, the great problem of concussion and percussion shells is solved. That a way will sooner or later be discovered, there can be but little doubt. Large projectiles, being made of iron, cannot of course be forced into the grooves of the gun like the leaden ball of small arms."

"Attempts have been made to cast on the outside of the cylindrical part of the shot some softer metal such as lead or composition to take the groove and give the necessary rotation, but it has invariably been found that although these metals take the groove at first they are immediately torn to pieces and off the iron part of the shot by the force of the powder. The increase of the force in powder cannot be calculated upon like any other motive power, and because a leaden projection of .01 of an inch will hold in its position a common rifle ball of 2 oz. in weight when acted on by 60 grains of powder, it does not follow that the same effect will be produced when these elements are increased a hundred times—much less when they are increased one thousand times, in a great many inventions of the day."

Mr Taylor's improvement consists in the application of a soft, tough and yielding alloy, and in so constructing the sabot that a portion of the gases is employed to compress the body of the sabot upon the base of the projectile, while another portion is employed to expand the sabot into the grooves of the gun, causing the shot to rotate and ensuring great accuracy of flight. One of the Smith Family.

Washington, D. C.

Artesian Wells.

Messrs. Editors:—In your issue of January 26th, in an article on "Artesian Wells," D. C. says, "Beneath the blue limestone there exists a heavy formation of sandstone, very compact in its structure, and not likely to have any reliable water-bearing strata. It is known in the New York Survey as the Potsdam sandstone. This formation rests on the primary rocks, and artesian wells cannot be expected in rocks of that age and depth."

I am happy to inform D. C. that his theory is not altogether correct, as a glance at the geological survey of our State will show you that we are in Ogdensburgh on the limestone formation and not a little above the Potsdam sandstone, yet we have two artesian wells, one at Arnold & Co.'s Brewery that has been flowing for six or eight years and is nearly one hundred feet deep. The other is at the Ogdensburg gas works. This latter well is about one hundred and one feet deep, and discharges a stream of about one inch in diameter, with a capacity of fifteen to seventeen galls. per minute, of the purest soft water imaginable. Some of our leading citizens will probably sink another this spring to the depth of three hundred or four hundred feet, perhaps more, on an eminence in our village, to supply their houses. S. S. Blodgett.

Ogdensburgh, New York, February 9, 1866.

Bridging the East River.

Dear Scientific:—You are growing more portly and more handsome as you grow older. You are a pearl of great price—a perfect mine of wealth. I hailed you when a "little shaver" many years ago. With increasing admiration I hail you now. Long may you wave for the benefit of the great engineering and industrial interests of our glorious land. Our country abounds in periodicals, but we have only one Scientific American.

Among the very many engineering enterprises discussed in your columns I have been much interested in the Broadway problem, which, it appears to me, is drawing to a practical solution in the grand project illustrated and described in a recent number of the current volume.

I see also that the bridging of the East River is looming up and various suggestions being elicited. In this line we have a most splendid achievement in the bridge thrown across our beautiful river between this city and the city of Covington, on the Kentucky side. It is a magnificent structure and commands the admiration of all that can appreciate the wonders of science.

In regard to bridging the East River it occurs to me that if we keep up with the spirit of the age and make proper use of the achievements of science, the proposition is not as chimerical as many might suppose. We are starting into a new era when steel will displace the great feature of this age and crowd iron out of ten thousand places in which for years we have held it to be supreme. I have not time nor data at hand to do so, but I trust some engineer will think sufficient of the suggestion to make a calculation of the difference in favor of steel over iron; estimating to drive iron completely out of place where strength and lightness of material may be required.

Another suggestion. I would propose a bridge exclusively for foot passengers as a preliminary experiment toward the final solution of the grand project. J. A. C.

Cincinnati, Ohio. Feb. 11, 1867.

Compasses on Board Iron Ships.

Messrs. Editors:—Your correspondent H., who wrote on this subject, page 122, appears not to understand the difficulty in question; he seems to think that the compasses are spoiled in the course of time by the effect of the iron in the ship, and says that fresh needles would always indicate the magnetic meridian. This is not so, but the iron of the ship itself is influenced by the magnetism of the earth is magnetized to a certain weak degree, strong enough however, to reach every compass on board, old or new. The magnetic meridian on board an iron ship, and even on board a wooden vessel by the influence of the iron used in its construction, is not the true magnetic meridian of the earth, and every compass will of course stand in the magnetic meridian as it is on board the vessel. Many years ago (some 40 or 50, if I am not mistaken) an attempt was made by Barlow, in England, to neutralize this magnetism of the ship's iron, by a contrivance called Barlow's correction plate: it consisted of an iron plate or steel magnet, placed in such a position, after repeated trials, in relation to ship and compass, that it counteracted the influence of the ship's iron; this however was only partially successful, as the magnetism of the iron is not the same in all portions of the ship, but shifts, by the induction of the earth's magnetism, when turning the ship around. The last correction is by Ritchie in Boston, lately patented, and appearing successful; he places his needle, floating on a liquid, above the vessel, finding a place where the influence of the different iron parts of the vessel neutralize each other. It has sometimes happened that a wooden ship was struck by lightning, and all the iron on board became so strongly magnetized, that the compass needle pointed always to the same part of the ship, in place of standing in the earth's magnetic meridian. The only disturbance the compass needle itself is subjected to, is either to lose its magnetism altogether, or to have its poles reversed, the north pole pointing south, and vice versa; but any compass needle of elongated form will always stand in the magnetic meridian, as it is at the place where the compass is situated, which meridian will often not correspond with the earth's magnetic meridian, in the same way as the earth's magnetic meridian in very few places corresponds with the astronomical meridian.

P. H. Vanderweyde M. D.

Philadelphia, Feb. 15, 1867.

An Inventor at the North Pole.

Messrs. Editors:—It may not be uninteresting to you, and your many thousand readers, to hear a few facts in regard to one of our countrymen, showing what perseverance and energy can accomplish.

In the winter of 1849-50, the writer of this was a resident of Cincinnati, Ohio. I chanced to make the acquaintance of a young man who was engaged in the business of casting brands for stamp tools, by a peculiar process of his own, using type for patterns. For want of better occupation, I engaged to take orders for him; his wife was making wooden dolls. Time passed, he engaged in the steel press engraving, and built up a good business. Onward, was his motto. Next I find him printing and publishing the "Penny Press" of Cincinnati, using the first (I think) hot-air engine used in the West. In all this time he had been reading all the works on Arctic exploration that were to be had, and he then conceived the gigantic scheme of another trip to the Polar seas, and through the aid of Mr. Grinnell, of your city, he was enabled to carry it out, and to-day is ice-bound amid the regions of an Acrtic winter. And that man is Charles F. Hall. The man who seventeen years ago was molding his little types in Miles Greenwood's foundery is now known throughout the world. Comment is unnecessary. O. V. Flora.

Madison, Ind.

The French Fire Alarm.

Messrs. Editors:—The French fire alarm mentioned in the issue of Feb. 9th as having been invented by Robert Houdin, is not new, as the undersigned while engaged in the manufacture of Telegraphic Instruments in Boston in the year 1858–1859, made a number of these instruments for the Hon. William Whiting, (late Solicitor to the War Department,) for use at his residence in Roxbury, and operated in connection with an Electro-Magnetic Burglar Alarm precisely in the manner

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described as the invention of Houdin. The name of the instrument as given by Mr. Whiting was an Electro-Magnetic Thermostat, and was first invented and put into practical use by that gentleman.

JUSTIN HINDS,
Supt. Salem Machine Co.

Salem, Mass , Jan. 31, 1867.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

DITCHING PLOWS.—John T. Miller, Iowa Falls, Iowa.—This invention consists in an arrangement of the cutters and wings of a plow or machine for cutting trenches in wet land, forming by one application of the draft of a powerful team, a ditch about two feet deep, thirty inches wide at top and twelve inches wide at bottom, while the sod and earth removed from the ditch, are laid up in a ridge or embankment on both sides by the wings of the plow. The whole construction is strong, simple and cheap, and especially adapted to the use of the farmers on the Western prairies.

APPLE PARER, CORER, AND CUTTER.—W. A. Coe, Greensboro, N. C.—This invention relates to a machine by which apples may be quickly pared, cored and cut into pieces without removing the apple from the fork.

SUB-SOIL ATTACHMENT FOR PLOWS.—R. J. Wheatly, St. Johns, Ill.—The object of this invention is to obtain a simple and efficient attachment for plows which will pulverize, loosen, or lighten up the soil at the bottom of a furrow made by the plow, and still not increase the draft of the plow to such a degree as to prevent a team from operating or drawing it with facility, when the attachment is set to penetrate into the earth at its greatest depth.

CORN PLANTER.—W. J. Hobson, Savannah, Mo.—This invention relates to a corn planter of that class which is designed for planting the corn or seed in check rows. It consists in a novel and improved seed-dropping mechanism, the arranging and operating of the same, whereby the machine may be used on rough or uneven ground and the seed dropped or planted in check rows, without the previous furrowing of the ground.

COTTON SCRAPER.—Turner Saunders, Memphis, Tenn.—This invention consists in attaching a scraper to a plow in such a manner that the cotton plants may be plowed or bared off, and scraped at one operation. Hitherto the cotton has been plowed or bared off with an ordinary turning plow, and a scraper afterward used, the latter implement being rather difficult to manage and not permitting the earth to be scraped evenly from the plants. This improvement admits of the two operations specified being performed simultaneously and with the greatest facility, thereby effecting a great saving in labor and preparing the work in a more perfect manner than usual.

CONSTRUCTION OF PLOWS.—W. D. Long, Wheatland, Pa.—The object of this invention is to produce a single plate of steel or iron rolled or formed in such a manner that the plow when finished will be thicker at these parts where it is subjected to the most wear, and the plow be capable of being constructed at a very moderate cost.

EXTRACTING STUMPS, RAISING STONES, ETC.—J. M. Gleichman, Evansville, Ind.—This invention relates to a machine for extracting stumps, raising heavy stones, logs, etc., and conveying or transporting the same to any desired place, and consists in the employment of one or more levers arranged in connection with a tackle and windlass, and a frame mounted on wheels, whereby stumps may be extracted with the greatest facility, heavy stones and logs raised and transplanted or conveyed from place to place, with but a very moderate expenditure of time and labor.

BUSHING FOR BARRELS.—David F. Fetter, New York City.—The bushing forms a lining for the bung hole or other holes in casks or vats; it is designed to save the wear and tear of the staves, and is secured by means of barbed creases on the outer periphery of the bush, which catch upon the wood and prevent its removal; the extended plate surrounding the bush may be fastened by rivets or screws to the staves if desired.

GRAIN VENTILATING AND DRYING APPARATUS.—James E. Strode, Litchfield, Ill.—This invention relates to an apparatus for ventilating and drying grain stowed away in bulk, and it consists in having one or more air ducts passing through the bin, box, or granary, in which the grain is placed, said duct or ducts being composed of slats arranged one above the other with spaces between, with openings in the sides of the bin, box, or granary for the admission of air into the duct or ducts, whereby the grain will be thoroughly ventilated and dried.

METALLIC HUBS FOR THE WHEELS OF VEHICLES.—James B. Stuart, Bunker Hill, Ill.—This invention relates to an improvement in metallic hubs for the wheels of vehicles, and it consists in a novel manner of securing the spokes in the hub, whereby the spokes are firmly retained in position and rendered capable of being readily detached and replaced by new ones whenever required.

RAKING AND LOADING HAY.—M. S. Rowson, Winhall, Vt.—This invention relates to a machine for loading hay on wagons, while the latter are drawn over the field. The invention consists of a series of rakes attached to endless chains and used in connection with a guide box, a rake and grating or shield, all so constructed and arranged that the hay may be raked up from windrows and elevated upon the wagon or cart to which the device is attached.

SEWING MACHINE.—E. H. Craige, Brooklyn, N. Y.—This invention consists in making the cloth plate of a Wheeler & Wilson sewing machine in three or more parts, one or more of which are movable, so that by taking off said movable part or parts, free access can be had to the feeder and all the parts to be oiled, which in ordinary Wheeler & Wilson machines can only be reached by uncovering the cloth plate. That part of the cloth plate which is situated under the needle consists of a tapering piece inserted in the direction in which the fabric is fed and held in place by the movable part of the cloth plate in such a manner that said edge shaped piece can be readily removed and replaced by another piece if it should be desirable or necessary.

PRUNING SHEARS.—Daniel Campbell, Elizabeth, N. J.—This invention relates to an improvement in pruning shears by means of which a drawing cut is obtained, instead of that obtained by the ordinary shears, which is a great improvement, as the drawing cut, whereby one blade is gradually drawn obliquely toward the cutting edge of another stationary blade, insures a better operation and a cleaner cut.

BORING MACHINE.—O. O. Crawford, Seneca, Wis.—This invention consists in constructing a machine so that the fellies of carriage wheels may be bored rapidly and in the most perfect and unerring manner.

CHURN.—D. O. Blair, Abingdon, Ill.—This invention relates to a churn of that class in which the dasher is attached to a vertical shaft and receives a reciprocating rotary motion by certain devices arranged above the cover of the churn, and the improvement consists in the construction of those parts by which the dasher shaft is revolved, by which the churn is operated in an easy and efficient manner, and which parts are furthermore so arranged that a slower or faster motion can be imparted to the dasher shaft without changing in the least the motion of the lever by which the whole is operated.

MOP HEAD.—Joseph Messinger and H. H. Mason, Springfield, Vt.—This invention relates to a new and improved mop head of that class in which a screw and a ratchet and pawl are employed for operating the jaws and retaining the same in position to hold a mop cloth.

SOWING RICE AND OTHER SEEDS.—Joseph A. Reynolds, Savannah, Ga.—This invention relates to a machine for sowing rice and other seeds which are grown in small drills. The invention consists in the novel means employed for distributing the seed and in an improved arrangement of furrow openers, whereby a very simple and efficient implement is obtained.

PIPE TONGS AND CUTTER.—John Balmore, New York City.—This invention relates to a tool which can be used with great advantage for screwing up and for unscrewing pipes of any description and also for cutting said pipes. It is provided with a swivel hook that catches over the pipe and is hung on gudgeons projecting from the ends of a nut into which the shank of the tool is tapped. The end of this shank forms a cup-shaped point, the edge of which bears against the pipe to be screwed or unscrewed. A hole bored in the center of the cup-shaped point serves to receive the cutter, the edge of which drops into a groove in the inner surface of the hook so that its cutting edge can be set up against the pipe to be cut without turning the cutter.

PROPELLING VESSELS.—Samuel B. Wait, Mariners' Harbor, N. Y.—The object of this invention is to provide a new manner of propelling vessels employing the oar principle at the stern of a ship, said oars being moved in such a manner by machinery that the full power of each stroke is utilized.

ROTARY ENGINE.—Friedrich Fischer, Garibaldi, Iowa.—This invention relates to a rotary engine which is composed of an annular cylinder fitted with a piston which is secured to a piston wheel. The steam is admitted at one side of an abutment in the cylinder and through cavities or channels in said abutment made of two parts which close up by the action of springs and which are forced apart by a wedge-shaped projection or secured to the piston and traveling with the same in such a manner that immediately as the piston has passed the abutment the two halves thereof close up and the steam acts on the piston until the wedge-shaped toe comes in contact with the abutment and forces the two halves thereof back, steam being shut off at the same time until the piston has passed.

WASHING MACHINE.—Charity Pendleton, Iowa City, Iowa.—This invention has for its object to improve the construction of the washing machine, patented July 12, 1859, and numbered 24,754, to which Letters Patent Schedule of additional improvement No. 281 was annexed May 29, 1860.

BEDSTEAD FASTENING.—James Maguire, Trenton, N. J.—This invention consists in the combination of plates or headed pins or bolts with the side rails and posts of the bedstead.

WASHING MACHINE.—William K. Short, J. W. Allen, and J. Craig, Mount Pleasant, Iowa.—This invention has for its object to furnish a cheap, simple, convenient, and effective washing machine, which shall be capable of self adjustment to any desired thickness of clothes.

LIFTING JACK.—Samuel Gulick, Klines Grove, Pa.—This invention has for its object to furnish an improved lifting jack, so constructed as to be adapted to raising heavy machinery as well as carriages and wagons, and at the same time be capable of raising them to a considerable hight.

TAKE-UP FOR KNITTING MACHINES.—Samuel Ward, Amsterdam, N. Y.—This invention relates to the take-up of knitting machines, whereby the action of the take-up is regulated by the tension upon the fabric knit in the machine.

HORSE HOE.—Moses Chandler and John B. Nickels, Kenduskeag, Me.—This invention consists principally in adjustably attaching wings or blades to the standards, and in the combination of pivoted rake heads with the free or rear ends of the wings or blades.

STOVE-PIPE JOINT.—H. M. Clifford, Philadelphia, Pa.—This invention consists in forming the joint, where lengths or pieces of stove pipe are put together without lapping them, and in such a manner that while the joint is equally tight the facility with which the pipe can be put up and taken down is greatly increased.

SPRING BED BOTTOM.—David Manuel, Boston, Mass.—This invention consists in attaching the slats of the bed bottom, by means of slots, hooks, or notches formed in or attached to the under sides of said slats, to coiled looped springs of a peculiar form, and in the combination of rubber rollers with the loops of said springs.

WINDOW-SHADE FIXTURE.—L. A. Tripp, Middletown, N. Y.—This invention has for its object to furnish an improved fixture by means of which window shades may be raised or held in any desired position.

COMBINED TABLE, CUPBOARD, CLOTHES RACK, ETC.—W. M. Baker, Fortville, Ind.—This invention relates to a table, with which is combined a cupboard, a clothes rack or frame, and a rack or frame for the reception of tinware, together with drawers, trays, and a rolling board, in such a manner as to be most convenient for use when so desired, and when not in use susceptible of being enclosed within the body of the table.

SINKING BORED WELLS.—Peter Ollon, Muncie, Ind.—This invention consists in an improvement in the auger and in the manner of hanging and operating the same for the boring of the well.

BOOT CRIMPING MACHINE.—John Joslyn, Canton, N. Y.—By the machine embraced in this invention the leather which is to be crimped, is drawn between two plates having series of circular depressions or cavities in their opposite faces, by means of a suitable shaped former, so arranged as to move between the said plates; the circular depressions working the leather, and condensing such portions of the same as are necessarily filled, as well as materially aiding in the filling process, and causing such a hold to be had upon the leather as it is drawn between them, as to stretch it out to the utmost extent.

SELF-WINDING CLOCKS, TIMEPIECES, AND OTHER MACHINERY.—F. G. A. Horstmann.—This mechanism consists of a tube constructed with a metallic piston, packed and cupped with one or more layers of leather or other materials, with a spring for keeping the piston pressed close home on the fluid in the cylinder. The piston works up and down within the cylinder, forming a perfect float or floating bucket. The cylinder is in connection with a vessel containing naphtha, spirits of wine, or other expansive fluid—glycerin or other oily matter being used therewith to prevent the evaporation of the naphtha or spirit. The alternation of temperature acting upon this fluid causes the same to expand or contract, thereby causing the piston to rise and fall, thus producing an impulse or motion either in a horizontal or vertical direction. To the said piston the inventor attaches a rod, and by means of a cross bar he causes a drum or wheel to revolve and carry an endless chain, which is passed over the main wheel of the clock, so that it hangs in a loop on either side, and to each of these loops he attaches a weight for giving the necessary working power to the clock and setting in motion the train of wheel work. This principle is also peculiarly adapted for raising greenhouse or hothouse windows, and for other similar purposes.

DOORS OF SAFES, STRONG ROOMS, AND OTHER RECEPTACLES OF PROPERTY.—J. Jessop and W. Warburton.—The object of these improvements is to prevent or render difficult the introduction of wedges, chisels, or other such means for the forcible opening of the doors or covers of safes, strong rooms, and other receptacles of property. For this purpose, in place of the edge or that surface of such door or cover which closes into or upon the frame thereof being formed straight, or of a series of straight lines, simply fitting close into one another, as is the usual manner, the patentees form the edge around the door or cover and the surrounding frame, with a series of short corrugations, serrations, or teeth, those of the door fitting closely into those of the surrounding frame.

ILLUMINATING GAS AND OIL.—G. McKenzie.—This invention relates to the obtainment of illuminating gas and oil from a combination of coal with shale oil or other mineral oil, and in subjecting the mixture to distillation or decomposition at various heats.

PREPARATION OF PEAT FOR RENDERING IT APPLICABLE TO THE MANUFACTURE OF ARTICLES WHICH ARE CAPABLE OF BEING PRODUCED BY STAMPING, MOLDING, EMBOSSING, OR ROLLING.—T. G. Ghislin.—In carrying out the invention the patentee takes any of the common kinds of peat, and having expelled therefrom, either by the application of pressure, heat or otherwise, such of the watery particles as can be easily removed, he mixes with it ground or comminuted seaweed, with the addition, if required, of any suitable gums, such as india-rubber, gutta-percha, or other substances of that class, or in addition thereto may be added resins natural or artificial, bituminous or albuminous substances, pitch, paraffin, stearine, or other oily and fatty matters; to give a body and firmness to the mass, chalk, talc, sulphur, siliceous, and other earthy matters may be added. Waste fibrous and woody substances may be incorporated with the other ingredients when it is desired to form sheets of the material, as for floor-cloths, and if the surface is intended to be painted, metallic oxides, such as white zinc, or ochre, alum, and other analogous ingredients, may be added.

MANUFACTURE OF ICE TO FIT IT FOR MAKING EFFERVESCING DRINKS, ETC.—O. W. Jeyes.—The inventor partly fills a vessel with the water, into which he forces carbonic acid gas; he then hermetically seals the vessel, freezes the contents into a solid state, opens the vessel and removes the ice, which may be employed in more or less large blocks in drinks to be made effervescin

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

A. S. J., of N. Y.—The velocity of water issuing from an orifice depends upon the ordinary laws of falling bodies, making proper allowance for change of direction and friction. Thus the velocity due to a fall or head of water of 16 feet is 32 feet per second. If the orifice, in this case, be placed against a current of water of the same velocity, there will be equilibrium at the orifice; if velocity of current be greater, water will rise in the pipe, if less the water will run out. From such data you can calculate the velocity a ship must have to discharge bilge water by means of a pipe which terminates in the outside water, and has its direction turned backward in the path of the ship. In this case the head of water to be considered is the hight of the surface of outside water above the surface of the bilge water.

J. M. S., of Conn.—It was promised by Act of Congress that the diameter of the new five-cent coin should be one-fifth of a decimeter. Our correspondent has measured it and found it to be ·81 inch and 5x.81=4·05. But a decimeter is 3 15-16 inches. We have noticed the alleged error before.

C. W. D., of——.—When an electro-magnet has become saturated no increase of battery power will give it a stronger lifting power. The diameter and length of the wire used for electro magnets should correspond with the intensity of the battery. A current of intensity will move through a fine wire, and low intensity requires a thick and short wire. But the magnetizing power is always proportioned to the total *quantity* of electricity passing through the wire.

J. E. B., of Mass.—The force of a fly wheel, (its power to strike a blow, etc.) is proportioned to the square of its velocity: double the speed implies four times the force. The formula

$$m\ v^2$$

applies to all such cases, m being the weight of the matter in motion and v the velocity. The case of the fly wheel is somewhat complicated from the fact that the weight is not evenly distributed, different parts moving with unequal velocities. Thus, though a rule for calculating the force is simple enough, it is impracticable to obtain the data for its application. It is best in practice to determine the force under a given velocity by means of a friction brake or otherwise, and then to this apply the formula

$$m\ v^2$$

for all other velocities.

R. M. H., of Pa.—The alloy of iron and manganese commonly used in the Bessemer process is produced directly from the ore. In Europe the alloy is known as Spiegeleisen and is produced in Germany. In the United States a similar alloy is found as a residuum in the manufacture of zinc paint from an ore known under the name of Franklinite. This Franklinite "ferro-manganese" can be procured from the N. J. Zinc Co. There is an abundance of ores in America capable of producing "ferro-manganese."

L. G. T., of Conn.—You will find information on the subject of beet sugar in our last issue.

J. W. W., of Ala.—Water is so little condensed by pressure, that even at the depth of five miles in the ocean it would be but a trifle more dense or buoyant than at the surface. The Atlantic Cable is several times heavier than water, and there is no doubt that it rests firmly on the bed of the ocean.

S. R. M., of Pa.—The clarifying of turbid river water by subsidence or spontaneous settling, is cheaper than filtration where a large quantity is needed for manufacturing purposes. We suggest that settling tanks or basins may be more practicable in your case. Perhaps the best filtering medium on the large scale, is simple clean fine sand.

C. C. P., of Ind.—It is a disputed question if genuine diamonds have ever been made artificially. But since we know that diamonds are only a form of carbon we may hope to learn how to produce them. The principal forms or conditions of carbon are: charcoal, plumbago, anthracite, lampblack and diamond. We know how to put carbon into all of these forms except the diamond.

J. L. E., of Pa.—It is said that an excellent way of preserving natural flowers is to dip them for a moment into a solution of paraffine in benzine, or into melted paraffine. By either of these ways the flowers are covered with a thin film of transparent paraffine which excludes the destructive effect of the air. Perhaps some correspondent will give a better process.

R. M. L., of Tenn.—Mica is a natural product, and no solvent for it is known, at least no solvent from which it can be recovered. In its chemical nature and composition it is quite like glass; both are silicates.

W. B. S., of Pa.—A substitute for bricks made of sand and lime is not new. There is a company in this city making such an article which looks very well. . . . . Meerschaum may be mended with glue or shellac.

G. D., of O.—You may find in previous issues several processes for coppering iron. One of the most recent, is to immerse the iron in a solution of tartrate of copper made alkaline by the addition of caustic soda. By practice only can you find the proper method for your purpose.

B. C. S., of Pa.—Civil engineering is taught as a speciality at the scientific schools of Harvard, Yale and some other colleges. In this city there is an excellent school for the special education of engineers under the charge of Prof. J. G. Fox. If you have no embarrassment concerning money you should attend one of these schools; otherwise the best course is to secure a place under some practical engineer.

J. M. P., of O.—The nebulae of Orion have been resolved since the death of Sir Wm. Herschell. The nebular theory of La Place, however still maintains favor with many astronomers. The telescope at Harvard College is without doubt more valuable for all ordinary astronomical purposes than that of Lord Ross.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Wanted.—Best wool carding and spinning machines and power looms. Manufacturers send circular and price list to C. Picard Co., Nebraska City, Nebraska Territory.

Geo. Davis, Martin's Ferry, Belmont county, Ohio, wants a spring, 1½ inches wide, length, 30 coils, to coil up on a 1-inch shaft, and to be twice as strong as an eight-day clock spring. Will some spring maker please write to Mr. Davis?

W. T. S., No. 1,702 Chestnut street, Philadelphia, Pa., desires descriptive circulars of metallurgical furnaces of all kinds.

Improved wood lathes wanted. Send cut with description and price list to Geo. W. Sweet, Flint, Mich.

John G. Clark, Guyton, S. C., desires to correspond with makers of laundry apparatus.

Staveless barrels are wanted by T. D. Ingersoll, Monroe, Mich.

Wm. S. Corning, Fort Edward, N. Y., wishes to communicate with makers of wooden shoes.

Paper-making machinery is inquired for by James Wright, Florence, Ala.

S. S. Perry, Utica, Ill., wishes to know where he can purchase asbestos.

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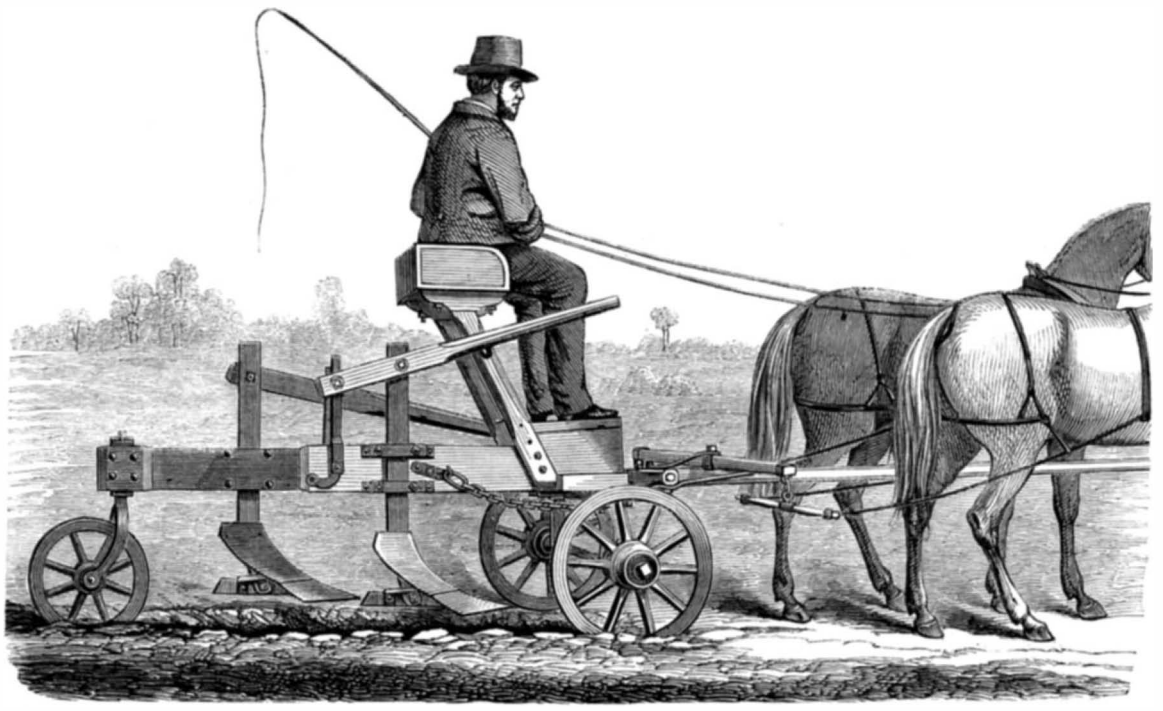
Improved Gang Plow.

The engraving gives a perspective view of a gang plow that appears to have the recommendation of strength, simplicity, and ease of operation. The two shares are attached to beams of unequal length, which are connected in front and supported by the axle, which is either bent to form a crank so that while one wheel travels in the furrow and the other on the firm surface the plow frame shall be kept level, or is two separate journals secured to either sides of the plow at unequal hights. The pole is in line with the shortest beam so that the horses can travel in a convenient position. The tail of the plow is supported on a caster, which, being pivoted, will turn freely in any direction, enabling the driver to turn his team in a space scarcely more than sufficient to turn an ordinary two-wheeled cart. A chain connects the axle with the short beam to facilitate the process of turning. The shares are secured to uprights which move in suitable guides, and they can be elevated or depressed by levers operated by the driver, as shown; one being operated by the foot and the other by the hand. The fulcrum of each lever may be adjusted, as desired, by bolts.

It is claimed by the patentees that the plow while light is very strong: that being short it is easily turned in any direction; that it can be made to plow deep or shallow, as desired, using one or both shares, and that it is easily managed even by a novice. It was patented through the Scientific American Agency, Nov. 20, 1866, by Bequeret & Demoulin, Jamestown, Ill., who will furnish any additional information desired.

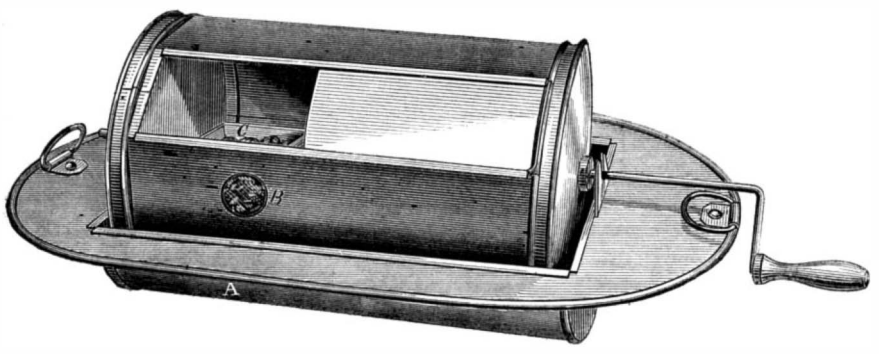


BEQUERET & DEMOULIN'S GANG PLOW.

Improved Coffee Roaster.

Lovers of pure coffee do not much fancy the miserable adulterations which are sold as ground coffee all over the country. It is not alone the low price at which roasted and ground barley, peas, stale bread, and chicory are retailed, that induces people to buy them in place of the coffee berry, but the trouble of roasting and grinding. The roasting process in an open pan, where the berries must be continually stirred to prevent scorching, is always one of anxiety as well as of labor. Several devices for reducing this care and insuring an even roasting are in the market, but they do not always fill all the necessary conditions.

The roaster herewith represented is a form of the rotary utensils so popular, but which, unlike many, permits an inspection of the process during its progress without opening the roaster or removing it from the fire. The cylinder is of brass or any sheet metal in octagonal, cylindrical form, the corners where the cylinder rotates insuring the perfect mixture of the berries. It is swung in a recessed plate with supports for the journals. The protecting sheet, A, prevents the cylinder itself from becoming too hot and exposing the berries to a red hot surface. The journals are not secured to the center of the cylinder but on alternate sides of the head, so that with the rectangular sides the berries are constantly shaken up from end to end of the cylinder as well as from side to side. The circular glass, B, is to enable the operator to see at any stage of the process how the roasting is going on. The glass is so secured as to give room for necessary expansion. C is a receptacle from which a few kernels can be easily withdrawn to test the roasting. This machine, by the substitution of a perforated in-place of a close slide is said to be an excellent corn popper. It is made of varying sizes from those capable of roasting two pounds to those of a capacity of one hundred pounds.



WHITNEY'S COFFEE ROASTER.

It was patented through the Scientific American Patent Agency Feb. 5, 1867. For additional facts and rights address Whitney & Van Valkenberg, Effingham, Ill. [See advertisement on another page.]

NEW USE FOR THE SUN.

Reported for the Scientific American.

At the February meeting of the Massachusetts Institute of Technology, Mr. Thomas Boyd gave an account of the "Solar Ventilator" invented by himself, in which the heat of the sun or, in its absence, artificial heat, is employed to produce the ventilating current. However efficacious revolving ventilators may be when the wind is blowing, they do not act in hot sultry days, when no air is stirring, and besides they are noisy and apt to get out of order in this climate. The face principle, by which impure air is forced out and pure air is forced in by mechanical power, is regarded by many with favor but, as this can only be applicable to large buildings, or where mechanical power is at hand, and expense no objection, it can never be of any great public benefit; it also labors under the disadvantage of complicated and expensive machinery. In ventilation as in other circumstances, persuasion is better than force, and the most effective forces in nature are believed to be those which move with the least friction.

It is well known that heat in a flue will cause an upward draft, and in this way produce ventilation. Artificial heat on a large scale has been found expensive, and especially inconvenient in hot weather, and in dwelling houses absolutely out of the question. Mr. Boyd's object was to secure ventilation in hot, still days, when ventilation is most needed, and when other ventilators fail and for this purpose he uses the heat of the sun, or artificial heat, applied very near the place of discharge of the impure air.

Mr. Boyd, in his patent Army tent, had already demonstrated the remarkable effect of a conical cap, closed at the top, in securing ventilation; this was amply proved in the field in 1861, near Washington, D. C.

In the solar ventilator, as constructed by Mr. Boyd, an iron chamber painted black, cone-shaped above and below, receives the sun's rays; these produce a great heat within the chamber and a consequent upward current and ventilation. By using solar heat no expense is incurred, and the highest power of the ventilator is on the calm hot days, when other systems of ventilation fail. In the absence of the sun's rays, any artificial heat, otherwise wasted, may be resorted to. Above the discharge pipe of this ventilator is attached a cone-shaped iron cap, by which a free discharge of impure air is secured without recoil or downward draft.

Though a great heat is obtained by the iron chamber without glass, experiments have proved that the concentration of the sun's rays by lenses upon a hollow metal ball within the heated chamber has important practical advantages. Though the lenses do not create any additional heat, they distribute it in such a manner that its concentration acts, with the mechanical arrangement of the ball and the interior, in the most advantageous manner for the production of a strong upward current.

It is believed to be of great practical importance to have the source of heat so near the place of discharge. The mechanical part is very simple and not liable to get out of order. He believes the principle to be correct, and its application new and it is applicable to buildings of every size and description, to mining shafts, and to all localities where ventilation is of the first importance. It is especially adapted to southern and tropical regions, as the hotter the sun the more efficient its action. He has applied it to his own and to other houses with most gratifying results. K.

Four Eclipses during 1867.—1. Annular eclipse of the sun on March 6th, invisible in America. 2. Partial eclipse of the moon on March 26th, visible in America, and in this latitude from about 2 to 5 A. M. 3. Total eclipse of the sun on August 29th, invisible in the United States. 4. Partial eclipse of the moon on the evening of September 13th, visible in America. The moon will rise eclipsed about 6 P. M., and the eclipse ends between 8 and 9 o'clock.

GUTTA PERCHA CABLE INSULATOR.

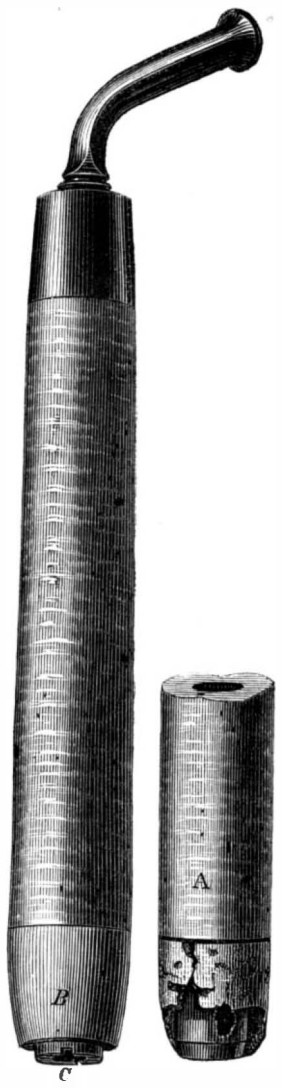
On page 140 we published a notice of an adverse report made by the Chairman of the Senate Patent Committee on the application of Geo. B. Simpson for the extension of a patent for insulating cable wires by gutta percha. We have since received a copy of the bill itself, with accompanying documents, from which it appears that Simpson never had a patent, and therefore could not be an applicant for an extension. It appears also from the records of the Patent Office that Simpson made application for a patent in April, 1849, for insulating telegraph wires by coating them with gutta-percha. The application was rejected in September of the same year, and subsequently withdrawn. About nine years afterwards Simpson made a second application, in which he claimed "the combination of gutta percha and metallic wire, in such form as to incase a wire or wires or other conductors of electricity within the non-conducting substance, gutta percha."

This claim was rejected Dec. 29, 1858, for want of novelty. The matters at issue were carefully reviewed by the Examiners-in-Chief, who reported to Commissioner Holt that the application should be finally rejected. The application of Mr. Simpson came before the Senate and House of Representatives in the form of a bill of relief, wherein he prays that Congress will authorize the Commissioner of Patents to hear and determine the application in accordance with rules in other cases.

The prayer of the petitioner was opposed by Samuel C. Bishop, the agent of the Bishop Gutta Percha Company of this city, by their counsel, George Griscom, Esq., of Philadelphia, who presented a strong array of proofs to show that the invention was not new. After a hearing of all the facts, the Senate Committee very justly, in our opinion, reported that the bill ought not to pass.

TRUMAN'S IMPROVED PIPE STEM.

Many smokers prefer the pipe to the cigar—the meerschaum or briar-wood with stem of cherry to the roll of the leaf. But there are some annoyances in using the pipe, one of which is represented at A, in the engraving. The cork sleeve on the stem where it engages with the neck of the bowl is so thin that, after being removed several times for the purpose of cleaning, it almost invariably splits and breaks, as in the illustration. The improvement represented is the substitution of a hollow plug of rubber, B, secured by a hollow screw, C, to the stem. This screw has a flat head or flange, which prevents the plug from separating from the stem and remaining in the pipe. The plug is not merely a sheath covering the wood of the stem, but is secured to the end of the tube thereby removing the wood, which is apt to rot from the effect of the nicotine, further from the bowl. If cork is preferred to rubber it may be secured in the same manner and will last much longer than where it is simply a thin collar. The improvement is one that every smoker will recognize at a glance. A patent was isued for it through the Scientific American Patent Agency, Jan. 15, 1867, to James W. Truman whom address for additional particulars, at Macon, Ga., Lock Box 21.



City Freight Railway.—The railway around Paris, on the left bank of the Seine, is completed, connecting the goods stations of all the great lines out of Paris without any break.

If one four-hundredth part of iodine is added to sulphur heated to about 180 deg. cent. (365 deg. Fah.), and the mixture poured on a slab of porcelain, there results a material which retains for some time a remarkable elasticity. It possesses a metallic luster and takes impressions with great fidelity

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VOL. XVI., No. 10....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, MARCH 9, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

*Stove for Heating Furnace Blasts 149
Steam on a Stampede 149
A Method of Controlling the Products of the Bessemer Process 150
The Late Alexander Dallas Bache. 150
Gleanings from the Polytechnic Association 150
Production of Natural Colors by Photography 150
Editorial Summary 151
*Improved Slate Iron for Carriage Tops 152
Employment of Acid in the Making of Sugar 152
*Combined Coal Hod and Ash Sifter 152
Philadelphia Butter 152
*Wilson's Combined Funnel Elbow and Damper 152
The Cannon King 152
*The Mechanical Equivalent of Heat 153
Curiosities of Combustion 153
The Menhaden Oil Mania 154
Elongated Shot and Shell 154
Artesian Wells 154
Bridging the East River 154
Compasses on Board Iron Ships 154
An Inventor at the North Pole 154
The French Fire Alarm 154
Recent Foreign and American Patents 155
Answers to Correspondents 155
*Improved Gang Plow 156
*Improved Coffee Roaster 156
New Use for the Sun 156
Gutta Percha Cable Insulator 156
*Truman's Improved Pipe Stem 156
Saying and Meaning 157
One Cause of Steam Boiler Accidents 157
Notes of a Flying Trip to Northwestern Pennsylvania 157
The Day Forty-eight Hours Long 157
American Exhibitors Abroad 158
State Trial of Breech-Loaders 158
Osborne's Photo-lithographic Process 158
Novel Improvement in Locks 158
Button Holes Done Away With 158
How Much Gas Is Required to Lift a Man 158
Patent Claims 158, 159, 160, 161
*Improved Overshot Wheel 164
American Beet Sugar 164
A Compact Engine 164
Pinchbeck or False Gold 164
A Curious Clock 164

SAYING AND MEANING.

We have for some time felt that the attention of educators, at the present day, ought above almost all things to be directed to accurate instruction in language. It is hard to say whether, in a public teacher by type or tongue, the knowledge of things or the knowledge of words to express them is the more important. Wanting either, the failure is complete; but wanting the latter, it is worse than failure, as much as delusion is worse than ignorance. The paramount regard to physical science which has been urged with great plausibility and success upon the present generation, need not be disputed. It is enough to say that by a law of nature that paramount regard is becoming well-nigh exclusive. We are but too material in our tendencies at best, and it is the nature of material objects to assert in us abundantly their own importance. The result of supplied assistance in this direction has been promptly felt in a negligence of language and a confusion of tongues which already seems like Babel come again. In the popular discussion of principles, hardly any one's meaning can be more than conjectured from his language, and friends and foes in opinion are often almost indistinguishable.

Disagreeable misunderstandings often arise out of this state of things. The exact appreciation and application of terms is nearly everything in scientific discussion, and it is but just to say that among those who have any recognized status as men of science, the abuse of language is not frequent. An instance of the kind, however, encountered us the other day from an unlikely quarter, illustrating the infelicity of loose language as forcibly as could be wished.

A paper was read which asserted the eternity of matter, and was referred to in this journal as atheistical nonsense, unworthy of the deliberations of a scientific body. The author sent us a long and irrelevant vindication of the liberty of thought, for which we had no room or need, together with a disavowal of atheism and a re-avowal of the eternity of matter, which we stated, in justice to him, but pointed out their inconsistency. More aggrieved than ever, he called upon us, complaining that we had misrepresented him. By eternity of matter, he did not mean eternity, but only indestructibility: the axiom that matter or force cannot destroy itself. But this gentleman, whom we never had the slightest inclination to injure or to wound, could not be convinced that he had misrepresented himself by abuse of language, and that eternity necessarily meant anything more than future continuance. He appears to be still engaged in "fighting it out on that line," and by the extreme indulgence of the Polytechnic Institute employing its sessions to ventilate his misplaced resentment at the fancied ill will or illiberality of the SCIENTIFIC AMERICAN. Nevertheless, we cheerfully do him the justice he has not done himself, by explaining that his heterodoxy is all in verbiage. He does not hold the eternity of matter any more than we do. He only holds peculiar opinions, to which he is perfectly entitled, on the meaning of words.

Numerous correspondents, laboring more or less under the general confusion of tongues, have since favored us with long communications *pro* and *con*, some of them very good, but which we cannot make room for. Our paper is devoted to science, but not in any measure to scepticism or speculation, as its readers well know, and by an incidental allusion to a metaphysical error, we had no intention of opening a metaphysical controversy, and cannot be drawn into it. The respectable scientific gentleman who prefaces his metaphysics with philology to prove that speculation means substantially the same thing as science, and therefore has a just claim upon our space, wastes argument on us which should be directed against the dictionary. Whether the language or its assailants will ultimately prevail in the struggle now raging, is an interesting question.

ONE CAUSE OF STEAM BOILER ACCIDENTS.

While attention is very properly being directed to the material, construction, and management of boilers with a view to diminishing the danger of explosions, it may not be amiss to recur to what under the latter head is not always a subject of investigation with those who endeavor to ascertain the cause of a catastrophe—the qualifications of the engineer. It is a somewhat singular fact that while the workman at any other business is expected to serve an apprenticeship at his trade before being considered competent to perform the work required, in many cases assurance and an assumption of superior knowledge procures an ignoramus the position of an engineer. On our railroads generally, we believe, a novitiate sufficiently long to insure the requisite knowledge, is demanded, before the fireman can have a machine, and in some cases the service in the inferior capacity is unnecessarily protracted. On some roads service as a fireman is required a number of months, which is unalterable in all cases. On others the superintendent of the rolling stock exercises his discretion as to the length of the term. We think this latter course the best, because while, if the superintendent is competent and impartial, a good judge of a man's capabilities, and unmoved by personal preferences, the interests of the company and the safety of the public are assured, no injustice is done a bright mechanic, and he is not made to suffer for the incompetency of others. One fireman may easily become a competent engineer on his route in a few months while another may run a year and then be unfit to be trusted with a machine. There is a great difference in the aptness of mechanics and in their readiness to compass an object.

Naval engineers also are usually required to pass the ordeal of a sort of apprenticeship; but the runners of stationary engines are not unfrequently selected for their willingness to work for low wages. If they can pack an engine, start and stop it, and keep it looking bright, they are considered by some employers as entirely competent. "Anybody can run an engine" is a common expression. True enough; and it might be added "an engine can run itself." The engineer, however, should be a mechanic who thoroughly understands the machine he manages and has some general knowledge of the powerful agent he attempts to control and direct. Boys who have an ambition to run an engine and men too indolent and ignorant for shop work are frequent candidates for the engineer's position. If they will work cheap the bargain is too often concluded, and when an explosion occurs from the stupidity or want of knowledge of the so-called engineer, the employer gropes about among the debris of the wreck to find some imperfect workmanship or material as the cause of the disaster. Few think to inquire about the engineer's management and such inquiries are often entirely fruitless; for if he, himself, is not buried in the ruin he has caused, he is discreet enough not to betray himself.

An engineer who will start his fires with the water below any gage, and without knowing anything about its level, is not an engineer. One who will open his blow-off and forget it while piling in the coal is hardly a safe man to have around. One who does not know how much pressure the weight on his safety valve denotes, or does not know whether the valve is fast to its seat cannot fairly be considered a competent engineer. Neither can one who places a prop over the end of the safety valve lever to "keep the steam from leaking out." Yet we have known men employed to run engines who have done all these insane and criminal acts. It would seem that here is an opportunity to discover the cause of some of those "mysterious" explosions" which so bother some investigators. Others beside boiler makers may be to blame if boilers explode and human lives are sacrificed.

NOTES OF A FLYING TRIP TO NORTHWESTERN PENNSYLVANIA.

In these days of rapid traveling it would be almost useless to inquire of the tourist, who desiring to leave one point and reach another employs the forces of steam to aid him and flies through the air with a velocity rivaling that of the birds, what he had seen on the route. Only by stoppages can he gain any adequate idea of a town, village, or even a way station. To be sure, there are the elements of a flitting panorama as he flies along over some elevated ridge, on this side seeing but the wall of densely wooded steeps, and on the other beholding, far below him, the level valley with clustered dwellings, a winding stream, a country road, a slow moving vehicle, and fields for cultivation. Or, he skims along the margin of a river whose waters some hundred miles away mingle with those of an ocean estuary near some mart of trade. Or, perhaps, he glides rapidly over a level plain dotted with cultivated farms and occasionally enlivened with the white houses and tall spires of a village. But all these are like the images in a kaliedoscope, as evanescent and as changing.

Still, if he spends an hour or two in a place he may so employ his time as to gain a very fair idea of the condition of business and the importance of a locality. On a westward trip a few days ago we tarried at Dunkirk. This is the western terminus of the great New York and Erie Railway, one of the finest roads in the country, whether viewed in its length, its solidity of construction, the noble bridges and viaducts on its line, the comfort of its cars, or its general good management. At Dunkirk is located one of its establishments for building and repairing locomotives and cars. At Susquehanna station is another, very much larger and more important. This we had no time to inspect. The works at Dunkirk are, however, very extensive and appear to be thoroughly well managed. Five new locomotives are now in process of construction at these works and a number of others are receiving repairs. Outside cylinders appear to be the favorite style. Whatever objections may have been urged against such cylinders by those who have used them on other roads on account of the increased oscillation of the engine, are valueless on the Erie road, which is of a wide gage. The driving wheels of the locomotives have hollow rims and hubs, which, we were informed, insures much greater evenness of structure and strength than a solid casting. The crank pins are of cast steel, finely fitted to the hole and forced home by hydraulic pressure without key or pin to secure them. The tires now used are of steel from Krupp's works, Prussia. They are in great favor with the engineers and the managers of the road.

There are some very fine tools in this concern, but we noticed they had only the common trip hammers for heavy forgings. Their work requires a direct-stroke hammer, as it is impossible to do square work of all sizes with equal facility on a trip. The castings, both of iron and composition, which are made at this establishment, appear to be excellent, and the finished locomotives are very fine and good workers, easy to control and powerful.

Erie, Pennsylvania, in the extreme northwestern corner of the state, has some fine manufacturing establishments. To say nothing of the railroad shops, which are of the first class, there is the large concern of the Erie City Iron Works which builds portable and other engines, saw mills, tools, etc. This establishment is building the Bradley engine, a machine having two cylinders of varying diameters but of the same stroke. The large cylinder is at the end of the frame opposite the crank, and the smaller one—one-half the diameter—is between it and the crank, both forming one casting, and both on the same line. Steam is admitted to the small cylinder and works at full pressure the entire stroke, or nearly so, and is then exhausted into the larger one, thus being used expansively. It appears to be an attempt to utilize all the power of of the steam, or rather to get all the advantages of using steam expansively.

The Bay State Iron Works at Erie, build engines and tools turning out some excellent work. The boilers especially which are built here appear to be made of the best materials and well put together. H. Jarecki has in the same city a large establishment for brass and iron work which possesses one peculiarity not shared by any other with which we are acquainted. He uses the gas from an abandoned oil well to furnish fuel for his engines and lights for his shop. The gas is led from the well, something over 1,000 feet distant, through a three-inch iron pipe, and is used to generate steam and warm and light the building. On Sundays and nights, when the works are not in operation, the gas is lighted at an escape pipe and burns so brightly that in the darkest nights the streets in the vicinity of the factory are brilliantly lighted. Chilled wheels for cars are largely manufactured in Erie, which satisfy all who have used them. The city, being the terminus of several important roads, is fast rising into commercial importance. The establishment of a grain elevator at the harbor, and the starting of a line of steamers from the city to Buffalo on the east, and Cleveland on the west, and a communication by water through the Lakes, the Welland Canal, and the St. Lawence, with Europe, will before long make it one of the most important depots in the country. It is the entrance of the oil region, and the products of the oil-producing portions of Pennsylvania, and its importance as an outlet to the coal mines of several counties, will soon bring this locality into prominent notice.

THE DAY FORTY-EIGHT HOURS LONG.

Last week we showed that the first beginning of the day is somewhere between America and Asia. The precise locality of that somewhere has not been determined. If the Pacific ocean were thickly populated with men, the place of the beginning of the day would be a matter of great consequence, and would probably be settled by statute. The day would start from a meridian line extending from pole to pole, and the longitude of this day line would be so accurately fixed that a man might stand astride it and realize the paradox of having one foot in Monday and the other in Tuesday. Many of the readers of this will live long enough to hear this subject discussed in national councils.

We propose now to show that Monday or any other week day is forty-eight hours long; we mean that during the whole of forty-eight hours, Monday is on the earth somewhere to be found. The Monday of this city is of course twenty-four hours long, but before and after our Monday there is Monday in some other quarter. When Monday begins in New York, there have been three hours of Monday in London, and for three hours after our Monday ends there will be Monday in San Francisco. Thus between these places Monday lasts eighteen hours. Now if the day line were at our antipodes, Monday would begin there twelve hours before ours, and end twelve hours after ours. Thus, for the space of forty-eight hours the earth is not rid of Monday. The fact may be illustrated in another way. Suppose we are at the day line. Monday begins, there and in twenty-four hours along comes Tuesday. But just west (half an inch if you please) Monday began only an instant before it ended east of the line. The Monday east of the line is twenty-four hours long, and west of the line is the same length and in all Monday lasts forty-eight hours.

BESSEMER PRODUCTS.—Valuable articles upon the subject which have appeared in one of the last numbers were prepared by Dr. Adolph Schmidt of Troy, N. Y.

GOLD OR SILVER LEAF, as a covering for spectacles, transmits the most delicate and agreeable light for extremely weak eyes. It is a good medium for looking at the sun.

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AMERICAN EXHIBITORS ABROAD.

The Paris Exposition will doubtless cause many articles of American ingenuity to be exhibited to the world which are peculiar to our country and consequently novel to artisans abroad. The list of agricultural implements is quite large and these alone will form an interesting display, as the majority of them differ essentially from those of foreign construction and many are entirely unknown in Europe. Some articles, however, which we have sent are common to both hemispheres and one of these, a city railroad car, we recently inspected at the manufactory of John Stephenson & Co., the celebrated car and omnibus builders of this city. This car does not differ materially in size and shape from those now running on our city roads, but it is constructed with a view of accommodating passengers on the roof which has a neat iron railing at each side and ornamented ladders extending up to it from the rear platform. The upholstering is exceedingly rich and the finish of the wood work surpasses anything of the kind we have before seen. The panels have well executed oil paintings on them, and the whole exterior is polished like a mirror. Our first impression was that this car must have been "got up" for the occasion, superior mechanics engaged in its construction and special artists employed to embellish it, in short, that it was something to look at and not to use. On inquiry, however, we found that it was one of a number ordered by the India-street Railway Company of Bombay, India, and is to stop at Paris on its way to the place for which it was ordered. We also learned that all the work was done by the regular employés of the Messrs. Stephenson, even the artist who executed the oil paintings on the panels is "to the manor born" and acquired his profession in their shop. We further learned that this firm built the first street car used in England and that they, a short time since, filled an order of five to run between Liverpool and Birkenhead. They have also furnished cars for Pernambuco, Rio Janeiro, Buenos Ayres, Valparaiso, Carizal and various other foreign places, and during the past year constructed and delivered three hundred and sixty eight cars and quite a number of wagons and omnibuses. It is exceedingly gratifying that the industrial accomplishments of our artisans demand such attention from abroad and that foreign orders are multiplying upon them. We cannot like our English cousins boast with reference to our "dominions' but we can now point with honest pride to our mechanics and say, upon their handiwork "the sun never sets."

State Trial of Breech-Loaders.

We give below the list of guns entered for trial before the State Military Commission at its late session in this city, with a table of the results:—

Spencer rifle, by Arthur Cheney, Boston, Mass. Gray gun, original, alteration and magazine carbine (making three in all) Joshua Gray, Boston, Mass. Milbank gun, alteration, Isaac M. Milbank, Greenfield Hill, Conn. Meigs rifle, alteration Jos. V. Meigs, Lowell, Mass. Needle gun, alteration, S. Weill, No. 421 East Houston street. Cochrane breech-loading musket and carbine, original, and alteration (two) J. W. Cochrane, No. 189 Broadway. Allen gun, alteration, A. H. Allen, Norwich, Conn. Miller's rifle, original, W. H. & G. W. Miller, West Meriden, Conn. Robertson & Simpson gun, original, Robertson & Simpson, Hartford, Conn. Empire breech-loading fire-arm, original, alteration (two), Geo. C. Walter, No. 64 Broadway. Berdan rifle, alteration, H. Berdan. Joslyn breech-loading fire-arm, two original arms, Wm. Herrick, No. West Ninth street. National rifle, National Arms Company, original, A. J. Bergen, corner Kent avenue and Hughes street, Brooklyn, E. D. Hubbell gun, alteration, James H. Crue, Philadelphia, Pa. Fitch gun, an alteration, J. P. Fitch, Fifty-second street, New York City. Aranson gun, alteration, J. N. Aranson, No. 7 Warren street. Poultney musket, original, Poultney & Trimble, Baltimore, Md.

Gun.	*Penetration.*	*Shots.*	*Time.*
Gray	11½	99	8:00
Page		20	1:45
Spencer		99	8:20
Miller	9	99	9:27
Berdan	11	99	6:20
Hubbell	11½	99	13;32
Meigs	11	99	5:40
Milbank		99	6:55
Empire	11½	96	4:40
National	11	91	7:45
Morgenstein	13½	38	4:30
Allen	11½	99	8:52
Rob rtson & Simpson	10½	99	8:30

Osborne's Photo-Lithographic Process.

We have lately examined some very beautiful specimens of photo-lithography, made under the auspices of the American Photo-Lithographic Company, No. 95 Liberty street, New York. They are produced by the processes of J. W. Osborne, patented in 1861, and some time ago noticed in our columns. For many years Mr. Osborne has been engaged in the endeavor to reduce his invention to commercial practice, and his efforts now seem to have been crowned with complete success. By means of these improvements all kinds of line engravings and printed matter can be copied, transferred to stone, and printed by lithography, at a trifling cost, with great ease and rapidity. Some of Mr. Osborne's copies of steel engravings that we have seen are really superb, being apparently equal to the originals. Letter-press pages may be reproduced, so exact in the imitation of the original that it is difficult to determine which was printed from the types and which by the photographic process. One of the striking advantages of this new art is that its copies may be made larger or smaller or of the same size of the orignals, every line of the latter being faithfully reproduced.

The uses of this remarkable improvement will be very extensive, and its effects upon the art taste of the masses will be universally beneficial. All the high priced, and rarest engravings can be duplicated by thousands, and the humblest homes be adorned with the best pictures for less money than is paid for the trashy pictorial stuff now too often seen.

Novel Improvement in Locks.

Mr. Er Lawshe, of Atlanta, Ga., at present at the office of G. W. Platt, 20 Maiden Lane, New York City, has recently patented through this office a lock for cars, mail bags, etc., which combines security and seal, and is very simple in detail It is so constructed that an agent at either terminus of the railroad can lock the cars "through" or "way" according to the destination of the freight; and it so combines both a "way" and a "through" lock as to render as much security as the ordinary lock, while as a "through" lock it affords additional security against picking or breaking. When a car locked "through" arrives at its destination with its tablet indicating "through," the evidence is that there has been no interference with it, thus showing, should the freight check short, that the agent who locked the car is the responsible party, but should the tablet show "through" and the lock be locked "way," or vice versa, it is evidence that the lock has been tampered with.

The construction of the lock is such that if one part should be acted upon another part secures the locking mechanism, whereby picking becomes somewhat impracticable if not impossible. This lock is not only applicable for a car lock but is also peculiarly adapted for mail bags, as with it the bags can be locked "way" or "through," as the case may be, thus enabling the locks to be permanently attached to the bags; and by increasing the number of tablets the lock can be more generally employed.

Button Holes Done Away With.

The use of buttons so made that they can be attached to the clothing without stitching by needles is becoming quite general, and an extensive use thereof has satisfied the public of the real value of the improvement. The man who has no wife may now step into almost any store, buy buttons of any pattern and attach them to his dress in a twinkling. One of the earliest manufacturing companies that engaged in this sort of button making is said to be now in the enjoyment of the princely profit of $250,000 a year.

We have lately examined a very excellent improvement in this class of patented buttons, shown to us by Mr. P. Chariatte, 587 Greenwich street, N. Y., which presents several superior points, of which one of the most striking is. that it does away with the necessity of button holes, thus saving labor, and preventing wear of the garment. The use of rubber is also dispensed with; the parts are all of the simplest form, and easily made by the usual mechanism; the mode of attachment is convenient; the buttons may be quickly applied or removed from the clothing, and the fastening is very secure. Altogether the invention is one of the best of its class that we have seen and is worthy of general introduction.

Science Familiarly Illustrated.

How Much Gas is Required to Lift A Man.

The question is often asked how large must a balloon be in order to lift a man. Many think it a very abstruse question, and not to be answered or reasoned about except by those who are well crammed with mathematics and chemistry. But the fact is, as we shall show, that in reality it is not beyond the comprehension of ordinary school boys; such questions ought to be put in the arithmetics.

We say a balloon goes up because it is lighter than the air. If it be a pound lighter, it lifts a pound, if it be a hundred and fifty pounds lighter it may carry up a man. But what does the lightness depend upon? What is it proportioned to? How shall we measure it?

A balloon is a bag filled with a gas lighter than the air. The lightest gas known is hydrogen. One hundred cubic inches of it weigh only 2·14 grains, while the same bulk of air weighs 31 grains. The ascending force of 100 cubic inches of hydrogen would therefore be the difference of these weights, that is 31·—2·14=28·86 grs. The ascending force of a cubic foot of hydrogen will be 28·86×17·28=498·7 grs. The ascending force of 1,000 cubic feet will be 498·7×1,000=498,700 grs. or 71·25 lbs. And 1,000÷71·25=14 feet in round numbers for the bulk of hydrogen required to lift one pound. Now this bulk multiplied by the weight of a man gives the cubic feet of gas needed to lift him as 14×150=2,100 cubic feet.

So far we have made no account of the weight of the bag. This should be added to the weight to be lifted. What the weight of the bag really is, depends of course upon the material of which it is constructed. Also in practice as the gas is not pure and is liable to leak away, an extra supply of gas must be taken on board. An aeronaut would not feel safe unless he had ascending power sufficient to lift two or three men besides himself.

Hydrogen gas is not often used when common illuminating gas can be had. But the latter weighs five or six times as much as hydrogen, and the balloon must be correspondingly larger.

Books and Men.—It is a very curious fact, if correctly stated by M. Natoli, that in Great Britain there are only six volumes, while in Italy there are 19·5 volumes to every 100 persons. As there can be hardly any practicable mode of estimating the books in private hands, the statement must refer to public libraries. The inference would be, that where fewest books are possessed by individuals, most books are provided publicly, and *vice versa*. It is added that in Bavaria there are 26·4 volumes to 100 persons; in France, 11·7; in Belgium, 10·4; in Prussia 10; in Austria 6·9, and in Russia 1·3. Total: France 4,389,000 volumes; Great Britain 1,771,493; Austria 2,408,000; Prussia 2,040,450; Russia 582,090.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING FEB. 19. 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the Scientific American, New York.

62,107.—Horse Rake.—Sylvester E. Ament, Oswego, Ill.

First, I claim the formation of a groove or channel, H, cut within and around the cylindrical part of the bearing, D, when employed substantially as and for the purpose herein set forth.

Second, I claim situating the radial or perpendicular faces, W X Y Z, within the joint rim or parts, E D G, substantially as and for the purpose herein set forth.

Third, I claim putting the stops, I and J, beneath the tangents of the strap, G, or in other words, concealing the same within the handle, E, substantially as and for the purpose herein set forth.

Fourth, I claim the employment of duplicate pawls, I and J, when adapted to operate relatively to one or more pairs of reversed faces, W Y, substantially as and for the purpose herein set forth.

Fifth, I claim the employment of a spring, K, inserted through a hole in the handle, E, and adapted to serve in combination with the duplicate pawls, I and J, substantially as and for the purpose herein set forth.

Sixth, I claim the employment of a cam shaft, n having a cam, n', and a hook, n, upon each end thereof, adapted to operate in combination with the locking devices of a single-handled revolving rake, A a a E, substantially as and for the purpose herein set forth.

Seventh, I claim the employment of a ball or weight, m, adapted to slide or to be dragged upon the earth behind the rake head, A, and to serve in combination with the locking devices of a revolving rake, A a a, substantially as and for the purpose herein set forth.

Eighth, I claim the application of the disk pieces, C C, to the ends of the shaft, A, when constructed and employed substantially as and for the purpose herein set forth.

Ninth, I claim the use of the bearing bolts, F F, when constructed and employed substantially as and for the purpose herein set forth.

Tenth, I claim, in revolving rakes, A a a, the use of one or more chocks or braces, T' T', when employed to brace the runner in rear of the rake head, substantially as and for the purpose herein set forth.

Eleventh, I claim the wooden runners, T T, provided with braces in rear of the rake head, in combination with a revolving rake, A a a, in such manner that the only point of contact of said runners with the ground shall be in rear of the rake head, substantially as and for the purpose herein set forth.

Twelfth, I claim, in combination with a single-handled revolving rake, A a a E, when its locking devices do not depend upon the teeth for resistances, except uniformly upon the whole, through the medium of the shaft, A. The employment of two pairs of reversed faces, W Y and X Z, when arranged relative to each other, and to pawls, I and J, or their equivalents, substantially as and for the purpose herein set forth.

Thirteenth, I claim the use of a check chain or connection, M', when employed substantially as and for the purpose herein set forth.

62,108.—Mucilage and Marking Brushes.—William R. Anderson, New York City.

I claim the combination of the shield tube, d, with the cemented surface of the brush tube, i, for extending moisture and forming a durable shield fastening, substantially in the manner set forth.

I also claim, in combination with the reservoir, the filtering plate, a a, substantially as set forth.

62,109.—Cultivator.—James Armstrong, Jr., Elmira, Ill.

First, I claim providing a shovel-carrying frame, D, which is pivoted to levers, C, so as to operate substantially as described, with an auxiliary adjusting lever, G, or its equivalent, whereby the driver can regulate the depth of the shovels at pleasure, whether the machine be in motion or at rest, substantially as set forth.

Second, I claim pivoting a lever, G, which has an eccentric bearing, g, upon one end, to the draft tongue of frame, D, and providing such lever with a locking device for holding it in any desired position, substantially as described.

Third, Supporting an adjustable shovel-carrying frame, D, upon the axle, A, by means of the levers, C, and an adjusting device, G g f h, substantially as described.

Fourth, I claim the use, in a cultivator, of an eccentric lever, g g, for the purpose described.

62,110.—Grinding or Polishing Implements.—Nicholas A. Buhle, New York City.

First, I claim the composition above described for making grinding or polishing stones, wheels, or other implements, substantially as above set forth.

Second, I also claim, in grinding or polishing implements or artificial stone, making their different surfaces, or portions of their surfaces, of different degrees of fineness, substantially as described.

62,111.—Liniment.—John W. Burnham, Winterport, Me.

I claim the liniment, consisting of the ingredients mentioned, combined substantially as described.

62,112.—Clock.—L. F. Carter and W. W. Carter, Bristol, Conn.

We claim the employment of the attachment, d, in combination with a clock movement, substantially as and for the purpose described,

62,113.—Furnace for Converting Iron into Steel.—Antoine Galy Cazalat (assigns one-half to Jules Despecher), Paris, France.

First, I claim the arrangement of parts, as above specified, applied on either side of the furnace for introducing steam into or through the molten metal.

Second, The upper reservoir of cast iron, as described, for the purpose of restoring to the purified iron the requisite amount of carbon for converting the same into ordinary steel.

Third, The conversion of ordinary steel into homogeneous steel by maintaining the liquid metal in a quiet state of fusion, and at a high temperature, by injecting steam in the chimney, and

Fourth, The means indicated of submitting steel cast in molds to high gaseous pressure, whereby the blisters are expelled and the metal close grained and condensed.

62,114.—Propeller.—R. D. Chatterton, Bath, England.

I claim the arrangement of the longitudinal pipes, B, the direct-action steam pump, placed between the diaphram valves, G G', and the reversing apparatus for the simultaneous operation of the said valves by a single motion, substantially as described and represented.

62,115.—Composition for Roofing.—John P. Cowing, Seneca Falls, N. Y.

I claim the simple compound of ground fire clay, rock, and coal tar, as specified.

62,116.—Mole Plow.—Jacob Creamer, Jeffersonville, Ohio.

First, I claim the combination of the rectangular frame, A, bent axles, B B', and hinged retaining bars, i and k, the said parts being respectively constructed and arranged for use substantially in the manner and for the purpose set forth.

Second, The arrangement of the swinging frame, A, capstan, b'", capstan head, b", parallel bars, C, chains, e, lever, d, and horse, f, substantially as set forth.

62,117.—Lifting Jack.—A. M. Culver, Bedford, Ohio.

I claim the arrangement of the legs, B B', pivoted to and in combination with the lever A, in the manner and for the purpose described.

62,118.—Extinguishing Fires.—R. Ogden Doremus, New York City. Antedated Feb. 6, 1867.

I claim the within described method of extinguishing fire by means of sulphurous acid, and ammonia or carbonic acid in a liquid or solid state, substantially as set forth.

61,119.—Sleigh.—A. E. Doty, Ilion, N. Y., assignor to J. I. New and C. H. Doty.

First, I claim a metallic runner curved and attached to the beam as seen in fig. 1.

Second, The compound ox-bow brace as is seen in figs. 1 and 2.

62,120.—Prepared Leather.—Smith Dyar, Charlestown, Mass.

I claim, as a new article of manufacture, skins prepared, printed, and polished, substantially as set forth.

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62,121.—CHURN.—Belden R. Eaton, Clifton, Wis.

I claim the combination of the two levers, g and i, so constructed and arranged on the shaft, h, that two motions or strokes are produced upon the dash, k and l, at one revolution of the handle, e, all of which will more fully appear and as shown in the drawing aforesaid.

62,122.—WASHING MACHINE.—Nathaniel T. Edson, New Orleans, La.

I claim, First, The combination of the apron with the rubber and with the segments, l, and guides, e e, in the manner and for the purpose substantially as specified.

Second, The combination of the elastic and non-elastic bands, b b and c c, substantially as and for the purposes specified.

Third, The springs, k, in combination with the rubber, B, and apron, A, for the purposes specified.

Fourth, The manner of hinging and fastening the revolving round, h, in combination with the rubber and the apron.

Fifth, The strips or bands, of elastic or non-elastic materials, d d, in combination with the apron and with the segments, l, and guides, e e, for the purposes specified.

62,123.—DRIFT.—John Elgin, Manchester, England, assignor to Thomas Aldridge Weston.

I claim forming the cutting edges of drifts of a series of double-edged diamond cutters by the intersection of two series of spirally inclined grooves in opposite directions, substantially as and for the purposes set forth.

62,124.—CHURN DASHER.—G. R. Forsyth, Pemberton, Ohio.

I claim a revolving churn dasher, constructed, arranged and operating substantially as described.

62,125.—APPARATUS FOR LIGHTING GAS BY ELECTRICITY.—Samuel Gardiner, Jr., New York City.

First, I claim the arrangement upon a bar of a series of keys so placed in reference to the burners as to be consecutively brought into electric connection therewith by a single impulse, substantially as described.

Second, I claim a sliding bar with an insulating support and furnished with keys adapted to a series of gas burners, for the purpose described.

62,126.—AXLE BOX FOR VEHICLES.—Cyrus F. Gillette, Sparta, Wis.

I claim a cylindrical or conical carriage axle box cast in one piece, with flanges, a and a', at each of its ends, and with separated Babbett or other soft metal bearing surfaces, b b, cast between said flanges, all substantially in the manner described.

Second, Holding the cast soft metal in its proper position by the combined agency of the flanges, a and a', and the sprue lugs which fill the sprue holes, e e, substantially in the manner described.

62,127.—RAILWAY CAR.—Abraham Gregg, Forest City, Cal.

I claim, First, The method of attachment of the extreme ends of the trucks to the car by king bolts, g', so that the brakes can be worked in the center of each shaft; also the combination and arrangement of the box coupling, D, to the center of the axle, so as to insure the twofold purpose of a brake wheel and coupling.

Second, The combination and arrangement of the double acting brake, E E, with springs, F, and levers, I H and K, so that it will clasp both sides of the wheel at the same time with equal pressure.

Third, The two bearings, a a, to each section of the axle, to prevent binding in the coupling box, likewise placing the springs, f f, between the trucks and platform and carriage so that each shaft will have bearings near its center.

Fourth, The cross tongue, h, attached to street cars, when operating in parallel slots, i i, so that when the car passes a curve the outer end of the cross will move back in the slot, bringing the draft on the outer ends of said cross or tongue, substantially as described and for the purpose set forth.

62,128.—COMPOSITION CALLED ARTIFICIAL IVORY.—Julius Hackert, New York City.

First, I claim the combination of chloride of zinc and lime with oxide of zinc or other metallic oxide, substantially as above set forth, for producing artificial ivory.

Second, I also claim the combination of chloride of zinc or other metallic oxide, and pulverized glass, or its equivalent, substantially as and for the purpose above set forth.

62,129.—CHURN.—Benjamin Handforth, Chicago, Ill. Antedated Feb. 3, 1867.

First, I claim the combination of the hollow handle, C, provided with an opening or openings, c, and the sliding sleeve, H, arranged and operating substantially as and for the purposes set forth.

Second, I claim the combination and arrangement of the hollow handle, C, provided with openings, c, the sleeve, H, and valve washer, d d, operating substantially as described and for the purposes specified.

62,130.—MANUFACTURE OF CARBONATE OF LEAD.—Henry Hannen (assignor to S. W. Greene and S. A. Hannen), Philadelphia, Pa.

The manufacture of a pure carbonate of lead by subjecting a mass of white lead (containing the oxide or the acetate of lead), mixed with water and heated, by the action of carbonic acid gas.

62,131.—INSTRUMENT FOR DIGGING POST HOLES.—James W. Harpen, Xenia, Ohio.

I claim the spring blades, C C, of rectangular form and construction and entirely separated, on opposite sides, so that they may be sprung apart, or away from each other, substantially as and for the purpose herein specified.

62,132.—APPARATUS FOR UNHITCHING HORSES FROM VEHICLES.—John K. Harris, Madison, Ind.

I claim the provision upon each shaft of a carriage, of a vibrating hook, J, adapted to receive and hold a tongue, E, upon the harness and to be released by the driver, through the instrumentalities of a strap, U, and its described or equivalent accessories, substantially as set forth.

Second, The releasable hitching lock consisting essentially of the vibrating hook, J, sliding bolt, N, and springs, O and P, the same being placed under control of the driver by the strap, U, and its accessories, as set forth.

62,133.—ICE-WATER RECEPTACLE.—Wm. H. Hart, Medfield, Mass.

I claim the above-described ice-water receptacle consisting of the urn, A, and the revolving disk or plate, c, for holding drinking utensils, substantially in the manner and for the purpose as above described.

62,134.—PIANO-FORTE ACTION.—Hiram Herrick, Boston, Mass.

I claim the combination of the arm, D, and its connecting rod, b, or the equivalent or equivalents thereof, with the piano-forte action consisting principally of the key, A, hammer, B, and jack or fly, C, as described.

I also claim the combination as well as the arrangement of the lever, E, and the adjustable stop, e, or the equivalent thereof, with the arm, D, and its connection cord, b, combined with the piano action as described.

62,135.—CAP FOR COFFIN SCREWS.—Geo. H. Howard, South Braintree, Mass.

I claim as my invention an improved arrangement of the latching devices, c d, of the coffin screw, cap cover and base, substantially as described, viz: so that the cover by its inherent diametric elasticity may be caused to operate as a spring to connect or engage the latching devices together and keep one of them in connection or engagement with the other or prevent their accidental engagement, as specified.

62,136.—GATE FASTENING.—S. E. James, Smithfield Station P. O., Ohio.

I claim, First, The combination of the pin or latch, c, the toothed support, C, and retaining device, b, substantially as described and for the purpose set forth.

Second, The block, d, arranged over the toothed wheel, C, substantially as and for the purposes described.

62,137.—PIPE TONGS.—John Johnson, Saco, Me.

I claim the combination and arrangement of the eccentric, a, set into the arms of the gas pipe tongs, pawl, C, spring, d, and the bolt, b, operating as and for the purpose set forth.

62,138.—CARPET STRETCHER.—W. J. Johnson, Newton, Mass., assignor to himself and H. A. Hildreth, Lowell, Mass.

First, I claim a carpet stretcher with a piston or its equivalent magnetically charged, for the purpose substantially as described.

Second, I claim a carpet stretching device in combination with a magnetic tack driving arrangement, for the purpose substantially as described.

62,139.—APPARATUS FOR EXTRACTING WOOL FROM MIXED ARTICLES AND FABRICS.—Arthur Knowles, James Knowles and Joshua Barraclough, Bristol, Great Britain.

We claim the means or apparatus shown and described, for the purpose of extracting wool from cotton and other vegetable substances contained in mixed fabrics.

62,140.—SPRING HINGE.—Chas. W. Lawrence, Milton, Ind.

First, I claim the combination with the leaves of a hinge of otherwise ordinary or suitable construction, of one or more compression springs, placed at right angles and transversely to such leaves and connected by a flexible and elastic steel or brass band, under the arrangement and for operation as herein shown and described.

Second, The combination of the tubular sheath or sheaths and the spiral spring with the elastic and flexible rod or band, substantially as shown and set forth.

62,141.—TELEGRAPHING APPARATUS.—J. J. E. Lenoir, Paris. France.

First, I claim the revolving rollers, H and H', in combination with the revolving screws, F F', traversing frames, I I', their magnets, K K', levers, J J', and armatures, e e', the whole being constructed, arranged and operating as described.

Second, The shafts, G G', and the rollers, H H', screws, F F', frames, I I', magnets, K K', and levers, J J', in combination with the trains of wheels, E E, or the equivalent to the same, the whole being arranged and operating substantially as and for the purpose set forth.

Third, A sheet of transfer paper and a sheet of plain paper combined with the roller, H, and arranged to be operated on substantially as and for the purpose specified.

Fourth, The combination of a receiving roller or holder, H', having an inked surface, a lever or pencil, J', and a sheet of transparent paper or its equivalent, for the purpose described.

Fifth, The magnets, O O', connected electrically with each other and the arms, l l, in combination with two instruments, A B, when the latter are constructed and operate together as described.

Sixth, The shaft, L, with its disk, N, and the shaft, L', with its arms, q q, in combination with the driving mechanism of two instruments, A and B, and with the arm, j, and the electro-magnet, P, the whole being constructed and operating substantially as and for the purpose set forth.

62,142.—MACHINE FOR SCOURING MARBLE.—Henry C. Lull, Montpelier, Vt.

I claim in the said marble scourer the combination of the handle, the troughed block, and the water vessel, constructed, arranged and applied together substantially in manner and so as to operate as specified.

I also claim the combination as well as the arrangement of the perforated tunnel with the troughed block the handle and the water vessels constructed, arranged and applied together substantially in manner and so as to operate as specified.

62,143.—RAILROAD BOX AND JOURNAL.—George F. Lynch, Milwaukee, Wis. Antedated Feb. 4, 1867.

I claim combining with a box or bearing for an axle or journal, a series or rollers or rings, not positively fastened to each other or to the box or bearing, but so controlled as to be kept in proper working position, and free to move with or independent of each other and with or independent of the journal or shaft, substantially as and for the purpose set forth.

62,144.—LEAKAGE ALARM FOR VESSELS.—G. B. Massey, New York City.

First, I claim the drum, D, having the plate, G, attached thereto by the pins, c, or an equivalent device, in combination with the jointed arm, E, of the hammer, when arranged to operate as and for the purpose set forth.

Second, The combination of the drum, D, having the plate, G, and pinion, u, attached, with the wheel, H, index, h, and dial, I, the drum being operated by the rising and falling of the float, F, as shown and described.

62,145.—FASTENING FOR CARRIAGE CURTAINS.—Theodore McPherson (assignor to John McPherson), Burlington, N. J.

I claim the combination of the screw, revolving barrel and flange, as represented in fig. 3, when the same are arranged and operate substantially as described for the purpose specified.

62,146.—APPARATUS FOR GRANULATING SUGAR.—F. Michael, Gratis, Ohio.

I claim the conduits, f c h L K d, and trough, m, in combination with the sugar house, A, the whole constructed, arranged and operating in the manner and for the purpose herein described.

62,147.—EVAPORATOR.—F. Michael, Gratis, Ohio.

First, I claim the filter, E, with regulating screw, s, in combination with pan, B, the whole constructed and operating in the manner and for the purpose herein set forth.

Second, A combination of pan, B, filter box, K, cooler, H, and conduit, the whole constructed, arranged and operating substantially as herein described.

62,148.—APPARATUS FOR HEATING AND COOKING BY STEAM.—Francis Milliken, Boston, Mass.

I claim the boiler and oven so constructed and connected that the hot air and products of combustion from the fire under the boiler, after being used to heat the oven, shall be returned through the flues of the boiler, substantially as and for the purpose described.

I also claim the pipe, g, for conducting the heat from the steam to the inside of the article to be cooked, substantially as described.

I also claim the hollow sleeve or spit, h, substantially as and for the purpose described.

62,149.—BRICK MACHINE.—Isaac Morley, Pittsburgh, Pa.

I claim the arrangement of the gear for operating the various parts of the machine, as herein shown and described.

Second, the tilting bars, e, for supporting and loosening the mold, when arranged and operated substantially as set forth.

Third, The combination and arrangement of the shafts, y and t, with the hopper, B, screw, S, and screw, W, substantially as herein described.

62,150.—LOW WATER ALARM FOR STEAM GENERATORS.—Stewart B. Palmer, Syracuse, N. Y.

First, I claim, in combination with a steam generator, the pipes, A C and E, connected and arranged to operate substantially as set forth.

Second, In combination with the bent pipe, C, and elbows, B and D, I claim the rods, M, substantially as and for the purpose set forth.

Third, The combination of the arm, I, attached to the elbow, D, or pipe, E, click, K, and valve stem, N, of the steam whistle, L, substantially as and for the purpose set forth.

62,151.—CORN HUSKER.—O. M. Pond, Independence, Iowa.

I claim the metallic plate, A, constructed and arranged as herein described, in combination with the elastic band, C, as a new article of manufacture.

62,152.—ODOMETER.—Wm. H. Prescott and Whitcomb Judson, Galesburg, Ill.

First, We claim the actuating shaft, C, disk, c, pivot, d, crank, e, and spring pawl, E, when combined with the screw shaft, D, and spur wheel, f, on the end thereof, substantially in the manner and for the purpose as herein described.

Second, The two shafts, C and D, as arranged and when used in combination with the two cog wheels, constructed substantially in the manner described.

62,153.—BUTTON.—Willoughby H. Reed, New York City.

I claim the concavo-convex disk, E, formed in respect to the projection, b, on the button, and having its edge adapted to an annular recess or indentation in the same, all as set forth for the purpose specified.

62,154.—MACHINE FOR SHEARING METAL.—N. B. Reynolds, Auburn, N. Y.

I claim in combination with a shearing machine for shearing stiff metal, the guides and gages, b c, constructed, arranged and operating for cutting off angular sections to adjusted shape, form and size, substantially as herein described and represented.

62,155.—WASHING MACHINE.—George A. Robinson, Mt. Pulaski, Ill.

I claim the arrangement of the geared roller, D, and the concave bed, C, yielding frame, B, connections, G H, and outside springs, K, attached to the bottom of the box, substantially as described and represented.

62,156.—TYPE TO PRINT FOR THE BLIND.—Henry Robyn, St. Louis, Mo.

First, I claim the five several type, as shown in the drawing attached to the specification.

Second, I claim the combination of the five several type, as shown in the drawings attached to my specification, in the manner set forth in the said specification.

62,157.—SOAP.—George Rose, Philadelphia, Pa.

I claim a washing composition consisting of the within-described materials combined in the manner and in the proportions herein set forth

62,158.—DEVICE FOR SLAUGHTERING HOGS.—W. M. and R. Savage, Chicago, Ill.

First, We claim the combination of the clutch, A B, and chains, C, or their equivalent, with a swiveled hook, E, substantially as and for the purpose specified.

Second, In combination with the above we claim the anti-friction roller, G, arranged as and for the purposes described and set forth.

Third, We claim the combination of the said clutch and its appendages with a curved inclined supporting track, L, arranged as and for the purposes shown and specified.

62,159.—ADJUSTABLE RACK OR SHELF.—Gerard Sickels, Boston, Mass.

I claim the swinging frame, C C, in combination with the standard, A A, and supporting bars, B B, when constructed and operating as and for the purpose set forth.

62,160.—ROCK CHAMBER DRILL.—Henry M. Stow, San Francisco, Cal.

I claim the chisels, B, connected with handle, C, in the manner described and for the purpose specified.

62,161.—METALLIC HUBS FOR THE WHEELS OF VEHICLES.—James B. Stuart, Bunker Hill, Ill.

I claim a metallic hub for the wheels of vehicles cast with a collar, B, having lateral flanges or projections, a, of the form shown and described, so that the spaces between the flanges which receive the spokes will be of wedge or taper form longitudinally, or in a direction parallel with the hub and of double taper form in a radial direction in combination with a loose collar, C, fitted on the hub and secured to the fixed collar, B, by bolts, substantially as and for the purpose herein set forth.

62,162.—STEAM GENERATOR.—J. W. Summers, Sandy Hill, N. Y.

First, I claim the generator, H, when constructed as and for the purpose herein described.

Second, The air chamber, D, for the purpose of governing and controling the pressure of steam in the generator, as and for the purpose set forth.

Third, The valve, I, for the purpose of dispersing the water, in the manner and for the purpose specified.

Fourth, The combination of the valves, L K and O, the air chamber, D, and generator, H, the whole constructed, arranged, and operating as and for the purpose herein set forth.

62,163.—SAFETY VALVE.—John Russell Swann, Edinburgh, Scotland.

I claim the combination and arrangement of the spring, h, and stud, k, with the lever, d, fulcrum, g, and its stem, g', substantially as described.

62,164.—MANUFACTURE OF ELASTIC ROLLS.—William A. Torry, Mont Clair, N. J.

I claim securing the rollers constructed of india-rubber and other vulcanized elastic gums to shafts or spindles by the use and application of the compounds and cement, substantially as and for the purpose set forth.

62,165.—COMPOSITION FOR ARTIFICIAL STONE.—George E. VanDerburgh, New York City. Antedated Feb. 14, 1867.

I claim an artificial stone or composition for various useful and ornamental purposes formed of silex in combination with silicate of lime with or without other ingredients when produced before the composition has been molded or allowed to dry and harden, substantially in the manner herein set forth.

I also claim the production of silicate of lime in combination with silex by excluding atmospheric air from a formed or molded mass or device composed of caustic lime and sand with or without other ingredients, and subjecting the same to moisture with or without heat, substantially in the manner and for the purpose herein set forth.

I claim also the application of steam to a composition containing silex or siliceous materials and lime in any form or in any proportions for the purpose of producing an artificial stone, substantially as herein set forth.

62,166.—ARTIFICIAL STONE FOR BUILDING.—Geo. E. VanDerburgh, New York City. Antedated Feb. 14, 1867.

I claim a finished block or stone of any desired form for building or ornamental purposes, produced substantially in the manner herein set forth.

62,167.—FOOT REST.—Isaac Van Hagan, Chicago, Ill.

I claim a foot rest, constructed substantially as and for the purpose described and set forth.

62,168.—LET-OFF MOTION FOR LOOMS.—Richard Walker, Milford, Mass.

First, I claim a let-off motion in looms effected by means of a horizontal sliding bar, R, provided with pawls, as described, in connection with a ratchet wheel, P, the said sliding bar being operated by the hammer, u, on the lay, which in its backward movement strikes the horizontal intermediate bar, M.

Second, I claim the combination of the pivoted pressure bar, C, located as described, with a series of adjustable levers and rods in such a manner that the tension of the warp upon the pressure bar will cause a bar, M, to be brought in a position to be operated by the backward movement of the lay and thus operate the escapement slide, R, substantially as described.

Third, I claim regulating the degree of tension which will determine the position of the bar, M, by means of the series of adjustable bars, levers and rods, operated by the pressure bar, C, located below the warp, substantially as described.

62,169.—COOKING RANGE.—Thomas C. Walter, San Francisco, Cal.

First, I claim the furnace, A, and the ovens, D and E, with the flues, K F f and h, with their regulating dampers, constructed as described for the purpose set forth.

Second, The compartment, C, in combination with the furnace, A, arranged as described.

Third, The register, N, with the damper, m, and the damper, B, combined with the furnace, A, as described.

Fourth, The arrangement of the furnace, A, with the damper, B, and the register, N, the ovens, D and E, with their flues and compartment, C, all operating together, substantially as and for the purpose set forth.

62,170.—HORSESHOE.—Benjamin R. Watson, New Bedford, Mass.

I claim securing calks in metallic shoes by fitting them with tapering dovetail tenons to tapering dovetail mortises cut through the shoes and tightening them by screws, or their equivalents, as set forth and described

62,171.—DITCHING AND GRADING MACHINE.—William J. Wauchope, Brookfield, Ill.

First, I claim supporting one end of the transversely-arranged endless conveyor, G, upon a roller, arranged in the main frame of the machine and the other end upon a roller having a vertically-adjustable supporting frame independent of the main frame, arranged and operating as and for the purposes specified.

Second, I claim the arrangement of the longitudinally-adjustable beveled bars, J, within the endless apron, G, and with the roller, I, operating as and for the purposes set forth.

Third, I claim the combination and arrangement of the plow, S, the transverse conveyer, G, stationary roller, H, adjustable roller, I, lever, J, and rollers, K, operating as and for the purposes described.

62,172.—SAD-IRON HEATING APPARATUS.—Joseph Davis Westgate, San Francisco, Cal.

I claim an ironing apparatus consisting of the sad-iron, B, and stove, A, constructed as herein described, lined with non-conducting material, substantially as and for the purpose set forth.

62,173.—SPINNING FLYERS.—Thomas Westley and Thomas Richard Beaumont, Preston, England.

We claim as our invention attaching split tubes to the legs and presser arms of solid leg flyers, substantially in the manner and for the purposes hereinbefore set forth.

62,174.—DIE.—Lorin Wetherell, Boston, Mass., assignor to himself and John H. Wells.

I claim the use in the trip hammer of dies constructed as described for the purpose of forging articles of the description specified.

62,175.—LIFTING JACK.—Eli Zimmerman, Pamelia Four Corners, N. Y.

First, In a jack for raising fences and for other purposes, I claim the swinging lifting hook arranged so as to be adjusted to different hights on and relatively to the sliding bar by which it is actuated, substantially as set forth.

Second, The combination of the sliding ratchet bar, the actuating lever, and the spring latch and pawl, of a slotted lifting hook suspended from said bar and adjustable thereon, substantially as shown and described.

62,176.—TABLE, CUPBOARD AND CLOTHES RACK.—W. M. Baker, Fortville, Ind.

First, I claim a combined table, cupboard, and clothes rack or frame, substantially as and for the purpose described.

Second, In combination with the above the rack or frame, N, for tins, rolling board, P, and tray, O, when arranged together and within the body of the table, substantially as described.

62,177.—PIPE CUTTER.—John Balmore, New York City.

I claim the cutter, D, and groove, d, in combination with the shank, C, nut, B, and hook, A, constructed, arranged, and operating substantially as described and for the purposes set forth.

62,178.—METHOD OF FORMING THE PARTS, LINKS, ETC., OF CHAINS, BRACELETS, ETC.—P. M. C. Beziel, Paris, France.

I claim the method, substantially as herein set forth, of forming links, leaves, or other similar artilces of gold or silver for ornamental or useful purposes.

62,179.—CHURN.—D. O. Blair, Abington, Ill.

First, I claim the combination of the lever, E, cord, c, pulleys, d, socket drum, C, and dasher shaft, B, with each other and with the frame, D, constructed as shown and operating substantially in the manner herein set forth.

Second, In combination with the above the vertical dashers, F, beveled toward their outer ends, for the purpose described, substantially as specified.

62,180.—PRUNING SHEARS.—Daniel Campbell, Elizabeth, N. J., assignor to Henry Seymour, New York City.

First, I claim the combination of the curved shank, e, of the movable blade, C, with the grooved plate, f, and stationary blade, A, substantially as and for the purpose herein shown and described.

Second, I claim the application to pruning shears of the double set of toggle levers, E, and arms, d, made and operating substantially as herein shown and described.

62,181.—HORSE HOE.—Moses Chandler, Corinth, Me., and John B. Nickels, Kenduskeag, Me., assignors to V. R. Palmer and J. B. Nickels.

First, We claim adjustably attaching the wings or blades, H, when formed as described, to the uprights, G, substantially as and for the purpose set forth.

Second, The combination of teeth or cogs with the blades, H, and uprights, G, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the pivoted rake heads, K, with the blades or wings, H, substantially as herein shown and described and for the purpose set forth.

Fourth, Securing the uprights, G, to the caps, C, and to the slotted cross bar, B, by means of angular bolts, E, and steady pins, I, substantially as herein shown and described.

Fifth, The combination of the stay braces, J, with the uprights, G, and adjustable caps, C, substantially as herein shown and described.

Sixth, The combination of the adjustable slotted caps, C, and slotted cross bars, B, having band, D, around their slotted ends with each other and with the draft beam, A, substantially as herein shown and described.

62,182.—WHEELWRIGHT MACHINE.—O. O. Chapman, Seneca, Wis.

I claim the head block, G, bearing the wheel, H, pinion, I, movable table, C, lever, T, treadle, Q, rod, P, and lever, F, when constructed, arranged and operating substantially as herein set forth.

62,183.—STOVE-PIPE JOINT.—H. M. Clifford, Philadelphia, Pa.

I claim the band b, constructed and applied substantially as described for the purposes herein set forth.

I claim the lip or flange a, on the end of the pipe in combination with the band b, as and for the purposes specified.

62,184.—APPLE PARER CORER AND CUTTER.—Wesley A. Coe, Greensboro, N. C.

First, I claim the tubular bar C, having its opening continuous throughout for cutting out the core and discharging it beyond the working parts of the device in combination with the shaft M, cross bar N, and bar D, in the manner represented and described.

Second, I claim the sliding bar D, provided with the bar L, in which is the ring i, substantially as shown and described

Third, The shaft M, and cross bar N, in combination with the bars C and D, for the purposes as shown and described.

62,185.—CULTIVATOR.—J. W. Connely, Charleston, Ill.

First, I claim the machine in combination with a cultivator of the several parts as arranged and described.

Second, The arms O, O, made either of wood or iron, and manner and place of attachment to bar or double-tree on forward end of hounds of frame as described and shown.

Third, The flexible connecting beams F F, with arms O O, either by bolts, pins or clevis, as shown and described.

Fourth, The bar B, arms O O, beams F F, and stocks T T, as constructed and shown and described.

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62,186.—WORK-SUPPORTING PLATE OF SEWING MACHINE.—E. H. Craige, Brooklyn, N. Y.

I claim a cloth plate of the Wheeler & Wilson sewing machine, constructed in three or more parts, the parts to be removed being tounged and grooved substantially as and for the purpose set forth.

Second, The throat piece f, constructed as described so as to be inserted in the cloth plate in the direction in which the fabric is fed, substantially as and for the purpose described.

Third, Holding the throat piece f, in place by the movable part b, of the cloth plate substantially as and for the purpose set forth.

62,187.—REFRIGERATOR AND WATER COOLER.—Henry L. Dayton, Maysville, Ky.

First, I claim the combination with a water cooler a, and reservoir or supply chamber F, of the double cock D,' G,' or its equivalent substantially as and for the purpose specified.

Second, I claim the perforated pan E, arranged and employed in combination with the pipes G, and D, in the manner and for the purpose set forth.

62,188.—COTTON BALE TIE.—H. Fassmann, New Orleans, La.

I claim the plate a, having a lot or opening b, provided with serrated or toothed sides to receive the end c, of the hoop and prevent the slipping or withdrawing of c, form b, substantially as shown and described.

62,189.—BUSHING FOR BARRELS.—David F. Felter, New York, N. Y.

I claim the bush constructed with the angular ridges presenting an inclined or wedge-shaped surface to the wood, while the bush is being driven into place and a flat surface opposed to the wood when a power is exerted to withdraw the bush substantially as described and represented.

62,190.—ROTARY STEAM ENGINE.—Friederick Fisher of Garibalcli, Iowa.

First, I claim the abutment H H, which opens from the middle, in combination with the toe i, on the advancing end of the piston B, constructed and operating substantially as and for the purpose described.

Second, The inclined planes k, in the piston head in combination with the abutment H H, opening from the middle substantially as and for the purpose set forth.

Third, The hinged or jointed valve stem N, cam M, and starting bar O, in combination with the piston valve I, abutment H H, piston B, and cylinder A, constructed and operating substantially as and for the purpose described.

62,191.—PERMUTATION LOCK.—Charles Flesch, Rochester, N. Y.

First, I claim the combination of two jaws G G, connected by the toggle levers r r, or equivalent, operating substantially as and for the purpose herein set forth.

Second, The combination of the dog plate F, with the jaws G G, operating substantially as and for the purpose specified.

Third, The combination of the oscillating fly g, with the dog plate F, or equivalent, operating in such a manner as to allow said plate to fall when centered, but to hold it elevated at all times as specified.

Fourth, The combination of the rollers or cams b b, of the head a, with the oscillating plate E, operating substantially as, and for the purpose set forth.

Fifth, So connecting the head, a, with the dog plate F, or equivalent that in turning from the bolt, said plate will only touch the cam points j j, but in turning toward the bolt, the dog will be allowed to fall, to unlock the device, substantially as set forth.

Sixth, Clamping the centre of the combination wheels in place, by means of a rim y, tightened or loosened by a screw a,' or equivalent as set forth.

Seventh, Connecting the screw a,' with the rim y by means of the shoulders b,' c,' or equivalent, and the slot d,' in such a manner, that the rim is attached to, and raises with the screw, substantially as specified.

62,192.—STUMP EXTRACTOR.—John M. Gleichman, Evansville, Ind.

I claim the lever G, tackle H, and windlass I, arranged, combined and applied to a mounted frame A, to operate in the manner substantially as and for the purpose set forth.

I also claim the supplemental lever N, in combination with the lever G, tackle H, and windlass I, substantially as and for the purpose specified.

I further claim the windlass J, in combination with the lever G, tackle H, and windlass I, substantially as and for the purpose set forth.

62,193.—LIFTING JACKS.—Samuel Gulick, Klines Grove, Pa.

I claim the bars B, C, sliding in opposite directions, pawls D, F, and F, G, lever H, and spring I, constructed and arranged and operating as herein set forth.

62,194.—WIRE REIN SNAPS.—William B. Hayden, Columbus, Ohio.

I claim the application of a guard or shield B, to a rein snap which is made of wire, substantially in the manner and for the purposes described.

62,195.—MONEY DRAWER.—Charles E. Hayes, Lancaster, Pa.

I claim the tongue and groove pieces with spring attachment to be made of wood or other material and for the purpose set forth in the specification.

62,196.—GATE HINGE.—Charles Hermann, Schuylerville, N. Y.

First, I claim the construction of a gate hinge of a leaf a, and plates b b, the latter having a wheel c, between them and an eye on one side for receiving the pintle on the leaf a, substantially as described.

Second, In gates which are allowed to move in a direction with their lengths and also to swing about on axis, I claim providing for elevating or depressing such gates at pleasure so as to adapt them for the summer or winter use, substantially as herein described.

62,197.—RAILWAY SAFETY GUARD.—Charles L. Heywood, Boston, Mass.

I claim a railway guard arranged and operating as described and for the purpose specified.

62,198.—CAR BRAKE.—Aaron Higley, South Bend, Ind.

I claim in a car brake and starter for railroad cars, the combination of clutch coupling D, pulley F, ratchet g, and pulley E, substantially as and for the purpose set forth.

62,199.—CAR BRAKE.—Aaron Higley, South Bend, Ind.

I claim in a car brake and starter for railroad cars, clutch lever G, Spring H, dog I, swivel J, and chains c, e, and o, in combination with clutch coupling D, ratchet g, pulleys F and E, substantially as and for the purpose set forth.

62,200.—CORN PLANTER.—W. J. Hobson, Savannah, Missouri.

I claim the wheel, I, provided with a sharp serrated edge, and fitted between bars, H H, attached to a shaft, G, to which the seed boxes, F, are secured, substantially as and for the purpose specified.

Second, The operating of the seed distributing bars, K, from the wheel, I, through the medium of the rollers, b b, attached thereto, the V-shaped lever, N, attached to the rod, M, the spring, O, and right angular levers, L L, all arranged to operate substantially in the manner as shown and described.

Third, The marker, J, attached to the axis of the wheel, I, when used in combination with the seed dropping mechanism, constructed and arranged as set forth.

Fourth, The treader, R, applied to the rear parts of the bars, H H, and arranged in relation with the driver's seat, substantially as and for the purpose specified.

62,201.—SAD IRON HOLDER.—Lewis Hover, Chicago, Ill.

I claim the combination of the springs, D, semi-cylindrical holders, A, and deflectors, B, when the parts are constructed substantially as and for the purpose set forth.

62,202.—BROOM HEAD.—James S. Hugg, Philadelphia, Pa.

I claim the combination of the broom head, A, with slitted ends, the partition plate, E, and socket, D, secured thereto, and the armed washers, f, substantially as described.

62,203.—CAR COUPLING.—Ernest V. Jeinsen, New York City.

First, I claim the hinged coupling pins, C C,' provided with shoulders, b b, in combination with lips, a a', and with the shackle bar, B, constructed and operating substantially as and for the purpose described.

Second, The adjustable springs, c c*, in combination with the coupling pin, C, shoulder, b, and lip, a, constructed and operating substantially as and for the purpose set forth.

62,204.—INDEX CHAIN FOR LOOM.—Barton H. Jenks, Bridesburgh, Pa.

First, I claim constructing the links of index chains for looms, with hooks and eyes or pins in such manner that the links can be readily separated from each other without removing said pins, substantially as described.

Second, The construction of hooked links of index chains for looms, with teeth upon them for entering spaces between the teeth of a wheel or rack for moving the links, substantially as described.

Third, The construction of hooked links of index chains for looms, with fast or movable studs, a, whether such studs be applied to the outer or upper surfaces, or to the sides of the links, substantially as described.

62,205.—SAWING MACHINE.—George Johnson (assignor to himself, Francis Brossy, and Adolphus Guadron), Detroit, Mich.

I claim the ratchet bar, a, and sliding or adjustable frame, Y, with the dog, x, and lever, I, attached thereto, and arranged to operate as shown and described for holding the wood.

61,206.—PRINTING APPARATUS FOR THE BLIND.—Daniel A. Johnston, Memphis, Tenn.

I claim the wheel, W, provided with the circular series of plungers, a, provided with impressional characters on their faces, and the plungers, b, provided with characters for the touch of the operator.

I also claim the stationary ring, g, provided with the depression, h, in combination with the plungers, b b, as and for the purpose set forth.

62,207.—BRICK MACHINE.—James J. Johnston, Allegheny City, Pa.

First, I claim a brick machine provided with a revolving disk, c, filling and discharging the mold or brick upon a bearing-off table, D, the whole operating substantially as described and for the purpose set forth.

Second, The bearing-off table, D, in combination with mold disk, c, plunger or press, f, lever, J, and cam, m, constructed and operating substantially in the manner herein described and for the purpose set forth.

Third, The locking pin, V, provided with arm, q, and spring, 1, when used in combination with the cam, 9, and openings, 6, in the mold disk, C, as herein described and for the purpose set forth.

62,208.—CRIMPING MACHINE.—John Joslyn, Canton, N. Y.

I claim crimping boots by passing or drawing the leather down and between two stationary or fixed plates having their surfaces opposite to each other, or with which the leather comes in contact, corrugated or formed with a series of circular or other suitable shaped cavities or depressions, substantially as herein described.

I also claim so arranging the corrugated plates, E E, or their equivalents, that they can be adjusted to any degree of pressure upon the leather being crimped, substantially as and for the purpose described.

62,209.—FENCE.—Theodore E. King, Painsville, Ohio.

I claim, First, A base for fence posts composed of the sole figures, 6 and 9, short standard, A, cap figures, 1 and 7, made separate and detachable and formed into a rigid body by means of the adjustable braces figures 1 and 9, used and operating in a pair or pairs, substantially as herein shown.

Second, Attaching the post, K, to the said base by means of the said braces passing through the flange, K', thereof, and secured thereto by the nuts, J J, substantially as and for the purpose specified.

62,210.—NECK TIE.—W. A. Laverty (assignor to Joseph Nicholson, Philadelphia, Pa.

I claim the plate provided with an elastic cord, E, secured to the arms, D, which form crotch, C, retaining the plate against the neck, and allowing the button to protrude through the crotch while resting on the elastic, substantially as described.

62,211.—MAKING PLOWS.—W. P. Long, Wheatland, Ind.

I claim forming the land side and mold board from one plate of metal in the manner substantially as described for the purpose specified.

62,212.—BEDSTEAD FASTENER.—James Maguire (assignor to John B. Brasher), Trenton, N. J.

I claim the plate, D, provided with the inclined slot, d2, so as to pass over the head of the pin, E, whereby the rails, A, are drawn against the posts, C, and the said plate and screw proportionately relieved from strain as herein set forth.

62,213.—BED BOTTOM.—David Manuel (assignor to himself and Willard Manuel), Boston, Mass.

I claim the roller-covered loop of the springs moving in the notches of the slats for the purpose described, as specified and shown.

62,214.—MOP HEAD.—H. H. Mason and Joseph Messinger, Springfield Vt.

We claim the fixed screw, B, on the handle, A, in combination with the ratchet, D, on the ferrule, C, the pawl, E, the jaw, G, provided with a tube or socket, having an internal screw thread to work on the screw, B, and the jaw, F, connected to the ratchet, D, and fitting in the ends of the jaw, G, substantially as and for the purpose herein set forth.

62,215.—DITCHING PLOW.—John T. Miller, Iowa Falls, Iowa.

First, I claim a ditching plow, constructed, arranged and operating substantially as herein described.

Second, The sole, B, with the plate. b, supporting the sward coulter, c, cutters, c1 c2, secured to the cross frame, C, the inclines, e, and mold board, D, combined and arranged substantially as described for the purpose specified.

62,216.—WELL-BORING AUGER. Peter Ollom, Muncie, Ind.

I claim the improved auger or well borer, constructed and operated substantially as described.

62,217.—RAILROAD SWITCH.—L. S. Packard, West Stockbridge, Mass.

I claim the arrangement of a set of parallel tracks, A, moving on pivots, B, and kept in a parallel position by means of the bars, C, when constructed and operating substantially as herein set forth.

The combination and arrangement of the rails, A, parallel bars, C, slotted lever, D, pusher, N, springs, L, rod, F, lever, E, lever, G, pin, H, and springs, J, as herein shown and described, and for the purpose specified.

62,218.—BEVOLVING BREAD TOASTER.—Joseph C. Paine, Dubuque, Iowa.

I claim the plate, A, with slots or guides, c c c c, thumb piece, F, sliding bar, B, with flutes or rests, D D D, and holders, E E E, or their equivalents, substantially as and for the purpose herein specified.

62,219.—HINGE.—Julius Parker (assignor to Charles Parker), Meriden, Conn.

I claim the combination of the socket, E, upon the plate, A, with the pivot, C, upon the plate, B, when constructed, arranged, and operating, substantially as herein set forth.

62,220.—WASHING MACHINE.—Charity Pendleton, Iowa City, Iowa.

I claim the water-tight compartments, E and F, formed by the partition, D, provided with the hole, G, and sliding gate, H, when constructed and arranged as herein set forth for the purpose set forth.

62,221.—AXLE BOX.—P. Philippi, Beardstown, Ill.

I claim the box, B, fitted into the hub, A, and provided with a nut, C, on its outer end, in connection with the thimble, D, provided with the screw, which is crewed into the inner end of the box, and the annular plate or flange, F, secured in the outer side of the flange, a, of the thimble, with the collar, b, of the arm between the shoulder, a', and the annular plate or flange, substantially as and for the purpose herein set forth.

62,222.—PAINTING AND VARNISHING WOOD AND METALS.—Waleriam Piotrouski, New York City.

I claim the new mode of preparing the surface of wood and of metals ready for the reception of finishing colors and varnishes, substantially as herein described, for the purpose of simplifying, shortening, and cheapening the whole process of painting wood and metals for carriages, etc., and to obviate in a great measure the cracking of the coat of paint when exposed to the influences of weather.

62,223.—CULTIVATOR.—Jonas Potts, Bridgeport, West Va.

First, I claim a cultivator provided with movable uprights, D D1 D2, and their arms, d d1 d2, to enable it to be changed to a double or single shovel plow, substantially as and for the purposes described.

Second, The yoke, C, provided with a plate. C', having a hook, f, fastened to it, to hold and support the arms, d1 and d2, substantially as described.

Third, The plow beam, A, provided with the projection, a, and tapering at its end, substantially as and for the purpose set forth.

Fourth, The combination of the plow beam, A, projection, a, yoke, C, plates, C', hooks, f, uprights, D D1 D2, with their arms, d d1 d2, substantially as and for the purposes described.

62,224.—MACHINE FOR RAKING AND LOADING HAY.—M. S. Rawson, Winhall, Vt., and C. B. Rawson, South Londonderry.

First, We claim the combination and arrangement of the pinions, b, rack, G, pawl, I, and box, D, in the manner as and for the purpose specified.

Second, The notched pulley, J, fitted in the draught pole, C, in combination with the rope, M, and pawl, L, all arranged and applied substantially as and for the purpose specified.

Third, The rake heads, Q, attached to the endless chains, P P, and provided with the bars, k, having pins, l, passing transversely through their ends, in combination with the guide tube, R, and box, D, in which the teeth, j, of the rake heads, Q, work in the passage of the rakes upward, as shown and described.

Fourth, The spring, m m', at the upper and lower ends of the guide tube, R, in combination with the flap, S, having the spring, n, bearing upon it, substantially as and for the purpose set forth.

Fifth, The combination and arrangement of box, D, shield, N, teeth, h, in the manner as and for the purpose specified.

62,225.—RAILROAD CAR VENTILATOR.—R. Reniff and Wm. W. Buttolph, Bloomington, Ill.

We claim the use of the vertical screens, J, covering the mouths of the receiving caps. H, in combination with the inner perforated plate, K, and water tank, R, having the partitions, S, constructed substantially as and for the purpose set forth and described.

62,226.—MACHINE FOR SOWING RICE.—J. Alston Reynolds, Savannah, Ga.

First, I claim the screws, c, fitted in grooves, b, in the bottom, a, of the seed box, E, and operated from one of the wheels, B, by gearing arranged substantially in the manner as and for the purpose herein set forth.

Second, The sliding or adjustable furrow openers, I, applied to the tubes, H, and arranged substantially as and for the purpose specified.

62,227.—PENCIL HOLDER.—Richard H. Ryne (assignor to William S. Hicks), New York City.

I claim the combined pen and pencil holder having pen and pencil both located at one end, and having the extension handle, B, arranged to operate as shown and described.

62,228.—COTTON SCRAPER.—Turner Saunders, Memphis, Tenn.

I claim the combination of the scraper and plow, the parts being constructed and arranged to operate in the manner substantially as and for the purpose herein set forth.

63,229.—WASHING MACHINE.—William K. Short, J. W. Allen, and John Craig, Mount Pleasant, Iowa.

We claim the horizontal rubber, D, consisting of the frame, b1, octagonal rollers, b2, projections, b3, and cross bar, C, when constructed and arranged as herein set forth.

62,230.—LOW-WATER ALARMS FOR STEAM GENERATOR.—J. H. Springer and W. M. Bartram (assignor to Henry Stellwagen, trustee), Philadelphia, Pa.

First, We claim the arrangement of the balance valve, f, with reference to the monitor and whistle, substantially as and for the purpose set forth.

Second, The combination and arrangement of the pendulum attachment with the stem of the water valve, substantially as and for the purpose set

Third, The arrangement of the test cock of the cylinder, the cup, D, and the valve stem, M, substantially as and for the purpose specified.

62,231.—SAND BOX AND CARRIAGE AXLES.—John S. Steele, Rockingham, Vt.

I claim the sand collar, C, and chamber, E, in combination with the extended pipe box, F, for the purpose set forth.

62,232.—BRACE FOR BITS.—Chas. H. Stockbridge, Whateley, Mass.

I claim the combination of the nut, B secured to the exterior of the socket of a brace or bit stock, with the dogs, C d C d, and cams, b b. all constructed, arranged and operating substantially as and for the purpose herein set forth.

62,233.—GRAIN DRYER.—James E. Strode, Litchfield, Ill.

I claim the grain ventilator and dryer, consisting of the inclined slats, a, with spaces, b, between them, when constructed and arranged as herein set forth, and for the purposes specified.

62,234.—LADDER.—Daniel B. Taylor, Avon, Mich.

I claim the application to ladders of a movable frame, B, having a step, D, and seat, I, attached together with friction rollers, I, band, M, crank, K, ratchet wheel, F, and pawl, G, constructed and operated substantially as above described.

62,235.—CURTAIN FIXTURE.—L. A. Tripp, Middletown (assignor to himself and C. H. Horton), N. Y.

I claim an improved window shade fixture, formed by the combination of the spring catch, F f', one or more radial arms, G, the coiled spring, E, and the journal, c', of the roller, C, with each other, substantially as herein shown and described, and for the purpose set forth.

62,236.—COMPOUND FOR COATING AND INSULATING TELEGRAPHIC WIRES.—R. S. Tucker, Brooklyn, N. Y:

I claim my application of glass finely ground or pulverized, and mixed or incorporated with linseed oil, tar, or other oleaginous and resinous substances, to insulate metallic wires or conductors in telegraph cables.

62,237.—MOP WRINGER.—Burk Van Alstine, Channahan Township, Ill.

I claim the hinged jaws, a a, furnished with the prongs, c c, and lever, b, when fastened to the side of a pail, all as and for the purpose herein set forth.

62,238.—PROPELLER.—Samuel B. Wait, Mariner's Harbor, N. Y.

I claim the arrangement herein shown and described for propelling vessels, consisting of the paddles, h, shafts, E and B. rod, d. pin, f, and sleeve, g, substantially as set forth.

62,239.—TAKE-UP MECHANISM FOR CIRCULAR KNITTING MACHINES.—Samuel Ward, Amsterdam, N. Y.

First, I claim the rollers, F, geared together at one end, and hung in a revolving frame, ratchet-wheel, H, pawl, I, lever arm, J X, rocker shaft, M, with crank arms, L and N, and stationary cam disk, Q, when all arranged together so as to operate substantially as and for the purposed described.

Second, In combination with the above, I claim the tension roller, S, so arranged in the frame, A, and with regard to the lever carrying pawl I, as to operate substantially in the manner and for the purpose specified.

62,240.—CLOTHES PIN.—W. G. Ward, Savona, N. Y.

I claim the arms, A, pivoted to each other at their centers, having notches, a, at both ends, on their inner faces, forming openings, C, when the arms are closed, adapting either end of the pin to be used, substantially as described.

62,241.—SHINGLE BAND.—James W. Wells, St. Joseph, Mo.

I claim an improved binder, made of a single piece of wood, notched and formed at the points where the corners of the bundle will come, substantially as shown and operating as described.

62,242.—HORSE SHOE.—Cassius M. Werner, Rockford, Ill.

First, I claim the clip, F, formed with a shoulder at its base, and a hole at its top, substantially as and for the purpose set forth.

Second, securing the shoe to the hoof by two nails clinched over or through side clips, substantially as and for the purpose set forth.

Third, Grooving the top of the clip, or punching the clip, to clinch the nails and protect the hoof, substantially as set forth.

Fourth, The combination of the clip, whether grooved or punched, with the plate by a nail clenched over or through the clip, and tightened by a screw nut under the plate, substantially as and for the purpose set forth.

62,243.—PLOW.—R. J. Wheatley, St. John's, Ill.

I claim a subsoil attachment for plows, constructed, arranged, and applied, to admit of being adjusted at a greater or less degree of inclination, and also adjusted higher or lower to penetrate the earth at a greater or less depth as may be required, substantially as herein shown and described.

62,244.—LAMP BURNER.—Norman L. Archer and Charles Deavs, (assignors by mesne assignments to Alexander J. Walker), New York City.

We claim a lamp burner, the cone or deflector of which is supported by a skirt or jacket in which are two or more ranges of slots alternating, substantially as and for the purposes specified.

62,245.—TABLE LEAF SUPPORTER.—Daniel Bull (assignor to J. B. Booker and W. P. Best), Amboy, N. Y.

I claim the bar, c b, in combination with the strip, d, as constructed, and the plate, a, when said plate is constructed so as to protect the end of bar, c, over which it rests, and is provided with an opening through which the pad, y, is operated substantially as and for the purpose specified.

62,246.—MACHINE FOR DIGGING POTATOES.—John W. Bartlett, Harmar, Ohio. Antedated Feb. 9, 1867.

First, I claim, in combination with the shovel, A, the track cleaner, D, when formed and attached substantially as and for the purpose set forth.

Second, I claim the revolving cylinder, v, when used in combination with the endless apron, M, and shovel, A, substantially in the manner and for the purpose set forth.

Third, I claim the adjustable shield, V, when used in combination with the cylinder, v, substantially as and for the purpose set forth.

Fourth, I claim the adjusting levers, H, and caster wheels, G', and arms, G, when used in combination with the shovel, A, substantially as and for the purpose set forth.

Fifth, I claim the combination and arrangement of the crank, W, and system of levers, W' X X', and X2, for giving a vibratory motion to the grates, Q and S, substantially as set forth.

Sixth, In combination with the vibrating grate Q, I claim the receptacle, R, and lever, R', the latter being operated substantially in the manner set forth.

Seventh, In combination with the vibrating grate, S, I claim the box, I, door, T', and rod, T2, said parts being arranged substantially as set forth.

62,247.—PUMP.—John Bean, Hudson, Mich.

First, I claim the box, C, constructed as described, and provided with the pipes, E and D, substantially as and for the purpose specified.

Second, The box, C, with its pipes, when used in combination with the valve plates, E and d, substantially as and for the purpose specified.

62,248.—BED BOTTOM.—Charles E. Best, Jordan, N. Y.

I claim attaching the ends of the straps, D D, to the lower ends of the pins, H, of a bed bottom when arranged in combination with the diagonal straps, C C, and Slats, B B, in the manner and for the purposes set forth.

62,249.—BRICK MACHINE.—George C. Bovey, Cincinnati, Ohio.

First, I claim the provision in a brick machine of the two feeding rollers, J J, having longitudinal corrugations, j' j', geared together to turn in the same direction as the respective mold wheels, and so as not to mesh in to each other, and operating substantially as shown.

Second, I also claim the punctuating points, h h' h'', operating within a hollow plunger, and operated by a grooved stationary cam, in combination with the pressing devices as shown and described.

Third, I claim the solid parts of the mold wheels, pressing the bricks as shown in the drawings, also the mold wheel when arranged with stationary grooved cam, hollow plungers, grooved friction roller, with puncturer operating or sliding through it, with shaft of mold wheel passing through the cam, all arranged and operating in the manner described.

Fourth, I claim the dividing tongue, L, when placed between the mold wheels, B and C, and when used for the purpose described.

Fifth, In combination with the mold wheel, B, I also claim the hexagonal or other square-faced pressure-roller, when made and used in the manner described, and for the purposes set forth, or any other polygonal spring roller, for the purpose of squaring the faces of the brick without scraping or cutting the clay, or the face of the brick.

Sixth, I also claim the combination of the mold wheels, B C, feed rollers, J J', dividing tongue, L, pressure rollers, M M', and aprons, N N', when made and used substantially as shown and described.

62,250.—PIPE TONGS.—Elijah Cash, Brooklyn, N. Y.

I claim the pivoted biting jaw, D, and toothed adjustable slide, B, in combination with each other, and with the serrated shank of the fixed jaw, A, and the locking cam, C, substantially as herein set forth, for the purpose specified.

62,251.—MACHINE FOR BURNISHING PLATED WARE.—Samuel A. Chapman, Waterbury, Conn.

I claim the rollers, A and R, revolving to operate in reverse directions, on opposite sides of the work as described, in combination with a longitudinal reciprocating feed motion to the work, at a less velocity than the periphery of the rolls, substantially as and for the purpose herein set forth.

62,252.—HARVESTER.—James Collins, Guelph, Canada.

First, I claim the combination of the intermittently moving endless apron moving parallel to the finger beam, to effect a side delivery with the vibrating cut off.

Second, The combination substantially as described of the cut off, and intermittently moving endless apron, with the driving mechanism and shipping lever for the purpose of enabling the driver simultaneously to stop the apron and withdraw the cut off, or to start the apron and interpose the cut off as set forth.

Third, The combination of the suspended endless apron, with tension pullies driving bands, driving pulleys, and shifting gear as described.

62,253.—COUPLING FOR CARRIAGE.—Hiram Conderman, Haskinville, N. Y.

I claim the bar, C, provided with the sections, F F, and annular box, E, when used in combination with the bed piece, A, as and for the purpose specified.

62,254.—APPARATUS FOR HEATING CARS AND OTHER VEHICLES.—Charles C. Converse, Brooklyn, N. Y.

First, I claim heating cars and vehicles by heat derived from hot water, substantially as described.

Second, I also claim the boiler, A, constructed substantially as described,

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with a well, A', extending downwards from its bottom into an inclosing furnace.

Third, I also claim the combination of boiler, A, furnace, G, steam condensing chamber, B, and pipe, E, arranged substantially as shown, for heating cars and vehicles by means of hot water.

Fourth, I also claim the use of a boiler or water receptacle in heating cars and vehicles whose ends are flattened, substantially as shown.

62,255.—PROPELLER.—Jacob Covert, New York City.

I claim a series of vertical floats or blades, b b, secured to parallel sides, E, and so arranged as to form a series of water compartments in combination with the crank, c c, substantially as described and specified.

62,256.—PROCESS OF COATING SHEETS OF MATERIALS WITH SOLUTIONS.—J. C. Crosman, Boston, Mass.

I claim the described process for coating sheets of material with fluid substances or compounds.

62,257.—HARNESS.—Commodore Daniels, Freemont, Ohio.

I claim the kicking straps, q r, U and V, the strap, P, the rod, T, the neck yoke, a, and the bars, Y, the whole arranged and operating substantially as herein described.

62,258.—BOILER FEEDER.—J. W. Doughty and B. F. Olmsted, Newburgh, N. Y.

First, We claim the combination and arrangement of the float, F, with the leg of the syphon, S, links, l' l', lever, l2 l2, weight, W, links, l4 l4, lever, b6, and valve, V, with the chamber, E, and tube, s2, substantially upon the principle and in the manner as herein set forth.

Second, The arrangementt of the short syphon leg, T, whereby to lower or raise it, substantially in the manner as herein set forth.

62,259.—SEEDING MACHINE.—Andrew R. Eggleston and Charles F. Swain, Ripon, Wis.

First, We claim a scatterer placed below the axle, and arranged and operated substantially in the manner and for the purposes set forth.

Second, The arrangement of a series of seed boxes between the grain box, and scatterer, substantially as and for the purpose set forth.

Third, The axle so constructed as form the frame supporting the seed box and cultivators, and the boxes between the seed box and scatterer.

Fourth, The combination of a gage plate, triangular openings in the bottom of the seed box, and feeding pinions, with the seed trough, substantially as and for the purpose set forth.

Fifth, The drag bars, when formed substantially as described and combined with the axle and cultivators, substantially as and for the purpose set forth.

62,260.—MATCH CASE.—Henry Ellig, Bridgeport, Conn.

I claim the combination of the triangular block, C, with the block, A, and jaws, d, when constructed and arranged substantially in the manner and for the purpose herein set forth.

62,261.—INDIA-RUBBER WHIP SOCKET.—Lewis Elliot, Jr. New Haven, Ct.

I claim the india-rubber whip sockets formed with the metallic ring or band around its mouth or open end enclosed within the india-rubber, in the manner and for the purposes set forth.

62,262.—BEDSTEAD FASTENING.—P. H. Freylinghousen, Jonestown, Pa.

First, I claim the plates, a a', dovetailed and recessed at the ends and adapted to each other and to the post, substantially as specified.

Second, The combination of the post, A, plates, a a', secured permanently to the post and the rail, B, with its recess, h, cross piece, d, and projections, i i, as described.

62,263.—CORN PLANTER AND CULTIVATOR.—Alexander M. Gow, Mount Vernon, Ohio.

First, I claim the frame, A, axle, h, windlass, D, with cultivator frames, B and B', all constructed, arranged and used as herein fully described.

Second, The hook, g, when constructed as described and used for connecting the shovel bars to the beams, by means of the block, b' as herein set forth.

Third, The guard, M, as constructed and used for the purposes set forth.

Fourth, The arrangement of the lever, n, with rod, s, and rod, q, for shifting the cultivators when used in the manner and for the purposes specified.

Fifth the arrangement of the bars, C, with their adjustable braces, J, as constructed in combination with the frames, B B', when used as and for the purposes set forth.

Sixth, The arrangement of the rails, G, with the board, E, rollers, E E, and seed boxes, H H, in the manner and for the purpose set forth.

Seventh, The shaft, P, arms, m m, and rods, e e, for operating the seeders when arranged as specified.

Eighth, The seed boxes, H H, with spouts, u u, all constructed and operating as herein set forth.

Ninth, The arrangement of the furrow openers, R, rollers, F, and arms, t, with the seed boxes, H H, and their spouts, u u, rubber blocks, y, and screws, w, when constructed as herein described and used as specified.

62,264.—LAND CONVEYANCE.—Lewis F. Hake, Salem, Ohio.

First, I claim in combination with the frame of a land conveyance which is mounted upon springs and adapted for sustaining the motive power and driving gear I claim the use of gimbal jointed shafts for transmitting motion to the axles of the transporting wheels, substantially as described.

Second, The use of the gimbal jointed and extensible shaft, G, for communicating motion to the forward axle of the guiding wheels, substantially as described.

Third, Supporting the forward part of the frame, A, upon the guiding axle by means of springs when said axle is sustained in part by a sliding segment, and operated by means, substantially as described.

Fourth, The arrangement of the jointed driving shafts, G h h, beneath the spring frame, A, substantially as described.

Fifth, The application of extensible rods, l l, to the transporting wheels of a land conveyance said rods being so applied that they can be made to protrude beyond the circumference of the wheels or drawn within the same at pleasure, substantially as described.

Sixth, Constructing the inner ends of the hubs of the transporting wheels with recesses which are adapted for receiving the clutch plates, t, substantially as described.

62,265.—GRATE FOR STOVES—Lewis F. Hake, Salem, Ohio.

First, I claim providing for contracting the exit passage for the products of combustion, from an open fire box, by means of a pyramidal or conical cap, substantially in the manner and for the purpose specified.

Second, The application of a door or its equivalent to the cap, G, substantially as described.

Third, Perforating the cap, G, when applied to an open fire box, substantially as described.

62,266.—MANUFACTURE OF ORDNANCE.—Gustavus P. Harding, Bohemia House, Cheswick, Eng.

I claim the combined arrangement of the parts, a b c, c' c, c3, the interior parts, c c' c2 co, being formed as explained and expanded by a mandrel, J, substantially as herein described.

62,267.—APPARATUS FOR TAPERING MEASURES.—Anson Hatch. New Haven, Ct.

I claim, First, The combination of the two arms and jaws with the index wheel and screw, when they are constructed, arranged and fitted for measuring tapers, substantially as herein described.

Second, I claim the combination of the two jaws with the index wheel and screw, when they are constructed arranged and fitted for measuring the diameter or sides of prisms or articles whose opposite sides are parallel, substantially as herein described and set forth.

62,268.—LIFTING JACK.—W. G. Hermance, Albany, N. Y.

I claim the lever, K, constructed as described in combination with the standard, B, and sliding piece, E, and their slots, g and h, opening together in the manner and for the purposes set forth in this specification.

62,269.—WINDMILL.—Frederic Hewitt, Newark, N. J.

First, I claim the sliding block, G, collars, R, rod or rods, s, and spider, F, arranged and operating in relation with each other and with the loaded lever, I, and sails, E, substantially as herein set forth for the purpose specified.

Second, The annular sliding block, M, and rod, N, arranged with reference to each other and with the loaded lever, I, and shaft or rod, J, substantially as herein set forth for the purpose specified.

62,270.—COOKING RANGE.—Maurice C. Hull, New York City.

First, I claim the descending flue or flues, i i, in combination with the air heating spaces, c2 and c3, and flues, m, passing to an elevated oven, substantially as specified.

Second, I claim the arrangement of the flues, i i i and m, for the products of combustion in combination with the air heating spaces, c2 and c3, and air flues, o o', as and for the purposes specified.

Third, I claim the rrrangement of the air flues, r s, and smoke flue, s' 4 and 5, in combination with the elevated oven, g, substantially as specified.

Fourth, I claim the escape damper, t, and pipe, t', for the fumes from cooking in combination with the elevated oven, q, as set forth.

Fifth, I claim the water vessel, q, fitted as specified in combination with the air spaces, n n and o', and elevated oven range as set forth.

Sixth, I claim a recess or groove between the water back and fire pot with openings to supply air to the fire, as and for the purposes specified.

62,271.—POTATO DIGGER.—James W. Innis, Newburg, N. Y.

First, I claim the two series of raking blades, E, arranged opposite each other in rear of the shovel plow, substantially as herein set forth for the purpose specified.

Second, The shovel plough constructed with its rear portion rounded or convex and furnished with breaking cutter cutters, b, substantially as herein set forth for the purpose specified.

Third, The supplementary side shares, E, and curved rearwardly extending rods, G, arranged with reference to each other and to the shovel plow, substantially as herein set forth for the purpose specified.

Fourth, The supporting braces, C, constructed with curved portions, a' and arranged in relation with the runners, B, shovel plow, A, and raking blades, E, substantially as herein set forth for the purpose specified.

62,272.—SHOVEL PLOW.—S. W. Jackson, Baldville, Ohio.

I claim the counter braces, G, adjustable screw rods or arms, D, provided with nuts, J, in combination with the standards, B C, and adjustable handles E, arranged in the manner and for the purpose set forth.

62,273.—ROAD SCRAPER.—William W. Johnson, Harrison, Me., assignor to N. Fannce, Hollis, and W. Bolster, Harrison, Me.

I claim providing the scraper board for excavating and moving earth whether such board is worked upon straight or crooked axles, with the lever, G, the forked link, B, the pin, D, the slotted pieces, E E, and spring, F, arranged and combined substantially as described and for the purposes set forth.

62,274.—ENVELOPE MACHINE.—John M. D. Keating (assignor to E. Keating), New York City.

First, I claim the elastic creasing rollers, l' l' in combination with the plunger, S, for folding the paper blank at right angles, substantially as described and for the purposes specified.

Second, The slotted feeding plate, O, in combination with the plunger, substantially as described and for the purposes specified.

Third, The elastic flap or presser, s' in combination with the folding mechanism, substantially as described and for the purposes specified.

Fourth, The counting mechanism in combination with the folding apparatus, constructed and operated substantially as described and specified.

62,275.—WASHING MACHINE.—James King, North Vernon, Ind.

I claim the combination and arrangement of the traversing box, H, with movable washboard, Q, and stationary washboards, G G, constructed to operate in the box on vat as described.

62,276.—FLESH FORK.—John C. Klien, Birmingham, Pa.

First, I claim the flesh fork prong piece, A, cast of any suitable metal, in combination with and fastened to the handle, B, made of wrought iron.

Second, The flesh fork made of two pieces united together, the prong piece, A, and handle, B, when said piece, A, is cast and the handle, B, is made of wrought iron.

Third, The pins, F F, cast all of one piece with the prong piece, A, of a flesh fork, substantially as and for the purpose specified.

62,277.—ACID COMPOUND FOR USE IN BAKING AND COOKING.—John E. Laner, New York City.

I claim the acid powder or salt obtained by the treatment of bone black with hydrochloric and sulphuric acid, substantially as herein specified.

62,278.—TRUSS FRAME BRIDGES.—F. C. Lowthorp, Trenton, N. J.

I claim the casting B, constructed and arranged for the reception of the diagonals, and secured to or forming a part of the upper and lower portions A, and A,' of the vertical of a truss frame bridge aqueduct, etc., all substantially as and for the purpose herein set forth.

62,279.—BOAT DETACHING TACKLE.—G. B. Massey, New York, N. Y.

I claim the rod A, provided with the right and left hand grooves to receive, hold and disengage the suspending loops or rings a, by positive movements when arranged for use in connection with a boat substantially as set forth.

62,280.—CORN PLANTER.—Henry Maxell, (assignor to himself and Levi Longabaugh), Canton, Ohio.

I claim the arrangement of the box A, sack c, hooks B B, seed slide D, as constructed and provided with its gage, spring and rod H, when the several parts are combined and used as and for the purpose specified.

62,281.—MANY-BARRELLED GUN.—Enrique A. Mejia, Mexico.

I claim the construction of a rotating axle provided with and having thereon a series of double cams L L L L, of the shape shown and so arranged or disposed around the circumference of said axle, as that their ends all situated at different planes or right lines, relative to each other as in Figs. 1 and 6, each of said cams being situated and working within a vertical slotted and side mortised plunger block or hammer head m m, n, o, together with the internal ratchet wheel w2, w2, the continuous ratchet t, the detents a2, u, the main spring q, r, s, and the ratchet spring b2, v, the whole combined with and operated by a hand trigger or winch handle x, y, z, whereby and through all of which the charges or loads, of a series of gun barrels or detachable magazines may be exploded and discharged in rapid succession d, by the backward and forward movement of said winch handle x, y, z, substantially as set forth and described.

62,282.—MEDICINE.—Abel Messex, Waynesboro, Ga.

I claim the composition mixture or medicine above described for the cure of small-pox which is made by following substantially the directions and descriptions above set forth.

62,283.—PRIMING METALLIC CARTRIDGES.—Isaac M. Milbank, Greenfield Hill, Conn.

I claim the base c, soldered or brazed into the cartridge case a, and covered by the base e, in combination with the fulminate tube i, and head o, setting within a countersink in the base c, as and for the purposes set forth.

62,284.—STILTS.—George Murray, Cambridgeport, Mass.

I claim the movable step as described in combination with the standard for the object specified.

62,285.—TUMBLERS WITH GUARDED CUTTERS.—Lewin A. Peck, Newton Corner, Mass.

I claim the combination as well as the arrangement of the lever knife and its operative spring with the thimble or finger clasp, as set forth.

I also claim the combination as well as the arrangement of the knife and its case or guard with the thimble or clasp as explained.

62,286.—SEED SOWER.—D. R. Prindle, East Bethany, N. Y.

First, I claim the seed bar E, constituted as described and used in the manner and for the purposes set forth.

Second, I claim the hopper D, with rod G, and spring with index H, and rest b, all constructed arranged and operating in the manner substantially as herein set forth.

62,287.—SEWING MACHINE.—T. K. Reed, East Bridgewater, Mass.

I claim, in combination with a sewing-machine shuttle race, an aperture or provision for insertion of an instrument or device through one of the walls or plates thereof so that when the shuttle is brought to rest at a fixed position connection can be made between such instrument or device and the tension mechanism of the shuttle, and the stress upon the shuttle thread may be regulated by such connection, substantially as described.

I also claim combining with such provision a device fixed to or forming part of the machine and so located that it may be thrown into and out of connection with the tension mechanism of the shuttle is at rest and be made to operate such tension mechanism, substantially as set forth.

62,288.—TENSION MECHANISM OF SEWING-MACHINE SHUTTLES.—T. K. Reed, East Bridgewater, Mass.

I claim combining with the screw shaft the spur or toothed wheel or nut, or its equivalent, through rotation of which the movement of the shaft is effected, to regulate the stress of the tension spring, substantially as set forth.

I also claim the combination of the hinged pad or plate, c, and the adjusting spring, h, when constructed and arranged to operate substantially as set forth.

62,289.—PEAT MACHINE.—Samuel Root (assignor to himself and W. H. Clark), New Haven, Conn.

I claim the combination of the two grinding cylinders, A and B, with the apron, G, scraper, S, and table, L, constructed and arranged to operate together, substantially as and for the purpose set forth.

62,290.—CORN PLANTER.—Daniel Ruppert, Nimisila, Ohio.

I claim, First, The above-described construction and arrangement of axle, L, provided with feed hole, M, in combination with the lock lever, N, and arm, O, substantially as set forth.

Second, I claim the rakes, H, in combination with the coverers, substantially as described.

62,291.—WRENCH.—Julius B. Savage, Southington, Conn.

I claim the collar, F, and ferrule, I, provided with a tongue, f, with the bar, A, when constructed and combined to secure the collar to the bar, substantially as herein set forth.

62,292.—SUGAR EVAPORATOR.—Shubel M. Shattuck, Cambridge, Ill.

I claim, First, The radiator, B, constructed substantially as described and for the purpose set forth.

Second, The dampers, D and d, substantially as and for the purpose set forth.

Third, The plate, C, in combination with the dampers, D and d, and radiator, B, substantially as described.

62,293.—MACHINE FOR EXTENDING TUBING.—H. A. Shipman and A. B. Hendryx, Ansonia, Conn.

We claim extending metallic tubing and reducing the thickness thereof by first applying external pressure to the tube which shall reduce its diameter, and then internal pressure which will restore or partially so the previous internal diameter of the tube shall alternate and elongate the metal, in the manner and by means substantially as herein set forth.

62,294.—HAIR CRIMPER.—John B. Siccardi, New York City.

I claim the arrangement of two series of round bars or rods, A and B, of different diameters in such a manner that one series of bars shall fit between and into the recess formed by the other series, said bars being hinged or fastened together at their ends, substantially in the manner and for the purpose as set forth and described.

62,295.—APPARATUS FOR SATURATING TIMBER.—W. B. Smith, La Fayette, Ill.

I claim the sack, A, constructed and applied substantially in the manner and for the purpose set forth.

62,296.—ARTIFICIAL TEETH.—S. W. Stockton, Philadelphia, Pa.

I claim the two holes, b and c, in combination with the slot, d, the same being constructed in the body, A, of a porcelain or artificial tooth or block of teeth, substantially as and for the purpose set forth and described.

62,297.—PAIN KILLER.—H. Stonebraker, Baltimore, Md.

I claim the above-described pain killer, when composed and used substantially as and for the purposes set forth.

62,298.—LINIMENT.—H. Stonebraker, Baltimore, Md.

I claim the within-described liniment, when mixed and used, substantially as and for the purposes set forth.

62,299.—MODE OF PHOTOGRAPHING ENGRAVERS' BLOCKS.—Benjamin F. Taylor, Philadelphia, Pa., assignor to himself and George Taylor, Camden, N. J.

I claim the use of a reflector, with a photographic camera for obtaining a reverse photographic impression on blocks of wood, stone, or metal, for the use of engravers, the said blocks or plates being coated with the solution above specified, or its equivalent, to receive the impression from the negative plates, substantially in the manner hereinbefore described.

62,300.—BAGGAGE CHECK.—George C. Thomas, Brooklyn, N. Y.

First, I claim the combination with a railroad or express check, having the number of the check indicated thereon, by a detachable piece, forming an addition to or supplementary part of said check, and attached directly to the check or to the check strap, which shall indicate the destination of the baggage.

Second, The combination with a railroad or expresscheck, having the number of the check indicated thereon, of a detachable piece forming an addition to or supplementary part thereof, and attached directly to the check or the check strap, and so made as to be capable of indicating by its color or shape the direction in which the baggage is to be sent, or the road or branch road over which it is to go.

Third, The combination with a railroad or express check, of a detachable piece forming an addition to or a supplementary part thereof, and indicating the direction or the destination of the baggage when the said detachable piece is secured in position either in part or wholly by the check strap, substantially as herein set forth.

62,301.—HORSE COLLAR.—James Clifford Tredway, Buffalo, N. Y.

First, I claim the staples, M, provided with lugs, n n, draft iron, O, having eyes, p p, and notches, q q, in combination with the tug, q, and collar, A A as constructed and arranged substantially as set forth.

Second, I also claim the manner of attaching a light tug, l, to the collar or hames by means of the projecting standard, J, provided with the head, K, which is secured in the end of the tug, substantially as described.

Third, I also claim the curved bar, B, rigidly attached to the collar frame on one side, and jointed to the other in combination with one padded frame of the collar when the latter is so constructed as to preserve ample space for the wind pipe, substantially as and for the purposes described.

62,302.—CULTIVATOR.—Lewis G. Tuttle, North Haven, Ct.

I claim the combination of the shafts, G H, when made vertically adjustable with the beams, C and D, when made horizontally adjustable, and the whole is constructed and arranged substantially as herein described.

62,303.—RAILROAD CAR STARTER.—A. A. Wilder, Detroit, Mich.

First, I claim in a device for starting cars the eccentric dog, h, wheel, G, a ms, f and g, spring, j, links, c and d, in combination with axle, B, when constructed, arranged, and operating in the manner substantially as shown and described, and for the purpose set forth.

Second, In a device for starting cars the combination of the eccentric dog, h, and stop, H, when operating in the manner substantially as shown and described, and for the purpose set forth.

REISSUES.

2,484.—GRAIN SEPARATOR.—Peter Geiser, Greencastle, Pa. Patented Oct. 19, 1852. Extended seven years.

I claim, First, A series of toothed bars, G, attached directly to a crank shaft having cranks at varying angles, said bars having reciprocating motion in parallel vertical planes and coming alternately or successively into action on the straw, substantially as and for the purpose set forth.

Second, I also claim in combination with the reciprocating toothed bars, G, the trough, A, when the bottom of the latter is sub-divided into tight and open portions, substantially as and for the purpose set forth.

Third, So arranging the reciprocating toothed bar, G, on a crank shaft having cranks of varying angles that the whole shall be counterbalanced substantially as set forth.

2,485.—MANUFACTURE OF SKIRT WIRE.—The Silver Skirt and Wire Manufacturing Company, New York City. Assignees of T. S. Sperry. Patented March 7, 1865. Reissued June 5, 1866.

We claim skirt wire protected wholly or partially by metal wire, substantially as and for the purpose described.

2,486.—COTTON BALE TIE.—Charles W. Wailey, New Orleans, La. Patented Oct. 9, 1866.

I claim the wrought or malleable iron self-fastening buckle or tie, A, when provided with curved projecting lips, B B', and openings, C C', and otherwise constructed as described for the purpose set forth.

2,487.—DRILLING AND BOLT TAPPING MACHINE.—Charles W. Coe, Fentonville, Mich.—Patented June 20, 1863.

I claim First, The arrangement of the level gear wheels, D E and H, in such a manner that the shaft, I, may therefore be revolved with more or less speed and power for the different purposes to which the machine may be adapted, substantially as herein shown and described.

Second, The automatic feed arrangement consisting of the ratchet, M, pawl, N, spring, P, and cam, Q, whereby the drill is fed to its work, substantially as set forth, the said feed arrangement being so made that it can be detached and the drill fed by hand, substantially as herein shown and described.

Third, In combination with the machine I also claim the vise for holding bolts for making screws, said vise consisting of the jaws, S S', and screw, V, arranged in the base, R, of the frame, substantially as herein shown and described.

Fourth, I claim the combination of the shaft, I and screw, K, with the pinion, H, and nut, L, whereby the rotary motion is given to the drill and also the necessary feed, substantially as herein shown and described.

2,488.—PISTON FOR STEAM ENGINES.—Orlando Kelsey and Joshua F. Bailey, New York City. Assignees of Benj. H. Hedden. Patented Aug. 4, 1863.

I claim the combination of the following instrumentalities, viz. the piston, the expansible packing ring, and removable tubular case with its valves and seats, substantially as set forth.

I also claim the combination of the expansible packing ring for a piston with a cylindrical shell, substantially as set forth.

I also claim the combination of the expansible packing ring, cylindrical shell, piston, and valvular apparatus, substantially as set forth.

2,489.—COAL DUMPING APPARATUS.—Edwin R. Kerr, and James L. Platt, Kewanee, Ill.—Assignees of Edwin R. Kerr. Patented Oct. 2, 1866.

I claim the chutes, B, placed in a shed or building when provided with two doors, C E, the outer ones, F, being so arranged or combined as to serve when lowered or opened as a continuation of chutes, substantially as shown and described.

I also claim counterpoising the outer doors, E, by means of weights, substantially in the manner as and for the purpose specified.

I further claim doors, C, when hung at their upper ends in combination with the bolts, D, at their lower ends, when said doors are applied to chutes, B, for the purpose herein set forth.

I further claim the chains or ropes, G, and weights, F, for adjusting and supporting the outer end of the extension door, E, of a chute, substantially as specified.

2,490.—HARVESTER.—Reuben Hoffhems, Dover, Pa. Patented Nov. 3, 1863. Reissued Nov. 7, 1865.

I claim, First, The combination in a two wheeled hinge joint machine of a drivers seat mounted upon the finger beam, and rotating around a vertical axis, or one nearly so, substantially in the manner described, for the purpose of enabling the driver to ride on the machine while the rake is in operation.

Second, The combination in a two wheeled hinge joint machine of a shoe with a hinge joint in it with a rake and platform having an extension, J 2, and with a draft frame which sustains the weight of the cutting apparatus, and raking apparatus with platform attached, at a point between the two drive wheels.

Third, The combination with the hinged joint machine of the inner shoe, and raking apparatus, substantially as described.

Fourth, The combination of a revolving or turning rake, extensible tumbling shaft and drawing shaft or axle of the main frame, substantially as described.

Fifth, The combination of a two wheeled joint machine, with a revolving raking apparatus and a drivers seat mounted on the main frame, substantially as described and for the purpose set forth.

Sixth, I claim driving a revolving rake, or a combined revolving rake and reel, which move about a vertical or nearly vertical axis by a device arranged on the grain side of the inner drive wheel or inner side of the draft frame.

Seventh, Making a direct driving connection between a revolving rake or a combined rake and reel which move about a vertical or nearly vertical axis, and the inner end of the main axle of the draft frame.

Eighth, Employing a tumbling shaft on the inner side of the draft frame for driving a revolving rake, or a revolving rake and reel which is mounted on a hinged finger beam or upon the platform.

Ninth, The combination of a quadrant platform, hinged finger beam, revolving rake and a drivers seat supported by the main frame.

2,491.—CLASP FOR METALLIC HOOPS.—James R. Speer, Pittsburgh, Pa. Patented Dec. 1, 1857.

I claim a clasp provided with an aperture or apertures and so bent across said aperture or apertures as to present an opening or openings for the easy insertion of the ends of the bands or hoops and form an efficient clasp for securing the ends of the band or hoop, substantially as herein described, and for the purpose set forth.

2,492.—LAMP BURNER.—Alexander J. Walker, New York City. Assignees of Emil Tritten, by mesne assignments. Patented Aug. 19, 1862.

I claim, First, The ranges or series of elongated openings or slots introduced into the burner and so arranged in respect to each other that the several intervening supports of one series come opposite the openings in the next series and thus compel the heat to traverse an indirect or zig-zag route, and thereby lessen the heat conducted to the oil receptacle, substantially as set forth.

Second, Constructing the wick tube in two parts with an open space between the upper which is exposed to the heat of the flame, and the lower part which is directly connected with the reservoir, the two parts being connected substantially as herein described so as to impede the conduction of heat from the upper part of the wick tube to the oil in the reservoir.

DESIGNS.

2,583.—MONOGRAM.—John H. Cummings, Boston, Mass.

2,584.—FRAME FOR A SEWING MACHINE.—Walker B. Bartram, Danbury, Ct.

2,585, and 2,586.—COFFIN HANDLE.—C. L. Leiberg, New Haven, Ct. (assignor to Sargent & Co). Two patents.

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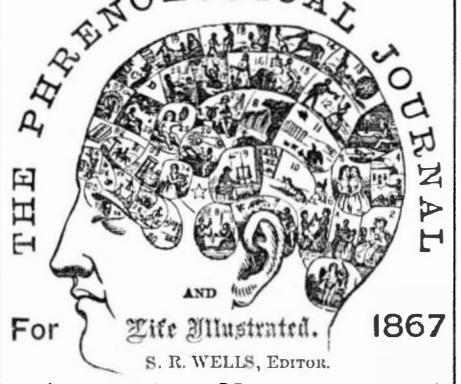

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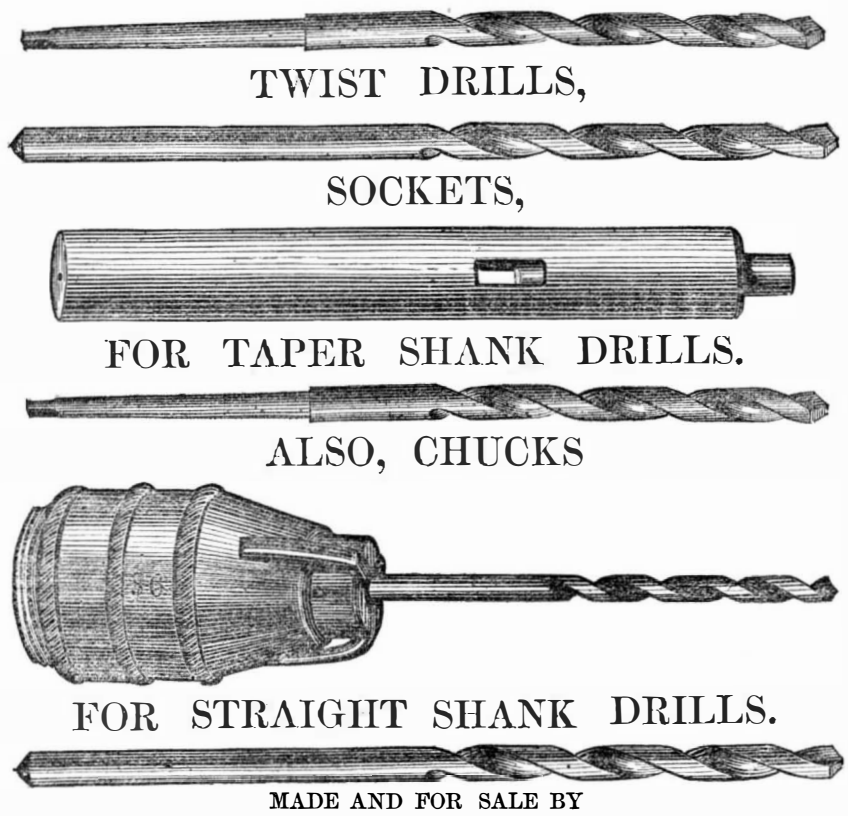

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We hear there are manufacturers infringing on some one or more of our nine patents in this machine. We caution the public from purchasing such.
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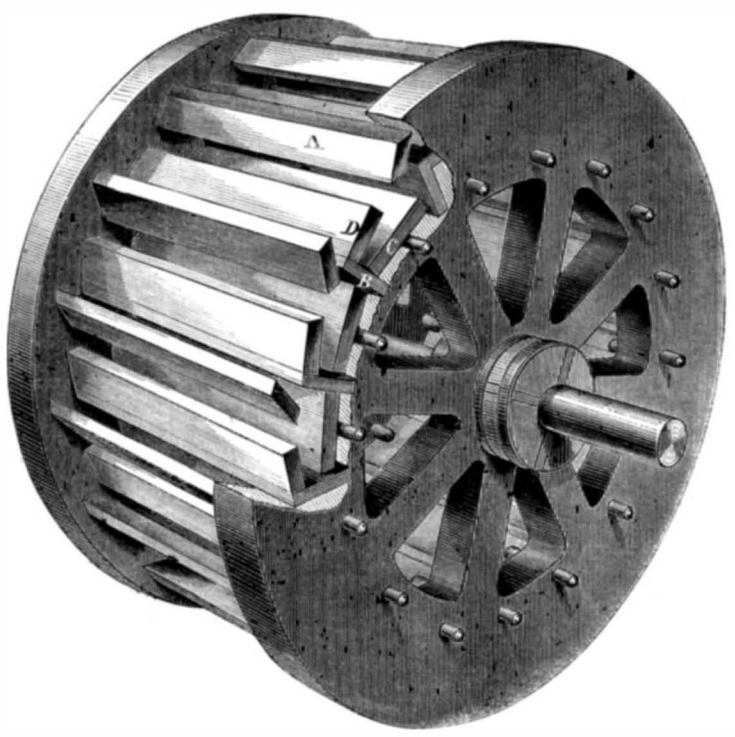
Improved Overshot Wheel.

The breast wheel is impelled solely by the gravity of the water thrown into its buckets, and the same is true to a large extent of overshot wheels. Some little force is undoubtedly derived from the impact of the stream on the buckets of the ordinary style of overshot wheels, but often a portion of this force is diverted by the form of the buckets. This improved wheel, which was patented through the Scientific American Patent Agency, Aug. 1, 1865, is intended to remove the objections to the ordinary overshot wheel and to increase its efficiency. The inventor says he has found by experiment that this form and arrangement of the buckets will yield one-third more power than the common overshot wheel, other things being equal, and he believes it is superior to any other wheel, not excepting the turbine.

The jet of water first impinges upon the inner edge of the upper bucket, A, the inclination of which directs the stream against the radial bucket, B, which, with the bottom and top, C and D, form a very compact receptacle, which holds the weight of the water securely until the wheel has made half a revolution. The heads of the wheel may be built of wood, or cast of iron with suitable shoulders for receiving the ends of the buckets. The bottom buckets C, are pinned through the heads, making a very strong and stiff wheel.

The whole patent right, or State and manufacturers' rights may be obtained by addressing the patentee, Andrew Jamison, Taylorstown, Pa.



JAMISON'S OVERSHOT WHEEL.

American Beet Sugar.

We have kept our readers thoroughly informed of the history, progress, and improvement of the beet sugar manufacture in Europe, and they will learn with an intelligent interest the circumstances of an experiment in this line begun last year in Illinois by a German company. They planted four hundred acres of land in Livingston county, mostly fresh prairie, from which they have raised a crop of more than four thousand tuns of fine beets, at a cost, according to their own estimate, of less than four dollars per tun. The juice was found to average 12 per cent of sugar, or 5½ per cent of refined "B." The capacity of the manufactory is estimated to be equal to fifty tuns of beets per day. During the few days the works had been in operation at the date of the report, they turned out about eighteen thousand pounds of sugar. The pulp was not watered on the centrifugals, in order to save evaporation. The juice was boiled blank and placed in large tanks to crystallize. This course was taken mainly to economize the use of steam. The first product granulated in twenty-four hours, and the second in three days, so as to go in centrifugal machines.

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The Holske Machine Company, at 528 Water street, New York, have running a very novel stationary engine, rated at sixty-five horse power, that is noticeable for its compactness and ease of working. It has two upright cylinders, the connecting rods of which are attached to a double oscillating beam in such a manner that when one is on the quarter stroke the other is at the end of the stroke. The valves are worked from horizontal shafts, having lifting cams which engage with friction rolls, by which the steam is cut off instantly at any required point of the stroke. Some of its movements are very ingenious, and although the whole engine occupies a space not more than four by five feet and four high, the work is in plain view and easily reached for repairs. It is a very smooth-working machine and worthy the attention of mechanics.

Pinchbeck or False Gold---A Curious Advertisement.

Pinchbeck was well known to the last generation as an imitation of gold and largely employed as a substitute for the precious metals in the manufacture of jewelry. It was the discovery of Christopher Pinchbeck who flourished in London in the early part of the last century. The metal was an alloy of five parts copper and one of zinc. Oreide has now usurped its place as an imitation of gold. Mr. Pinchbeck appears to have been quite a genius if his advertisement, published in *Applebee's Weekly Journal* of July 18th, 1721, is reliable:

"Notice is hereby given to Noblemen, Gentlemen and Others, that Chr. Pinchbeck, Inventor and Maker of the famous Astronomico-musical Clocks, is removed from St. George's-court, St. Jones's-lane, to the sign of the 'Astronomico-musical Clock,' in Fleet-street, near the 'Leg' Tavern. He maketh and selleth watches of all sorts and Clocks, as well for the exact Indication of Time only, as Astronomical, for showing the various Motions and Phenomena of planets and fixed stars, solving at sight several Astronomical problems, besides all this a variety of Musical performances, and that to the greatest Nicety of Time and Tune with the usual graces: together with a wonderful imitation of Songs and Voices of an Aviary of Birds so natural that any who saw not the Instrument would be persuaded that it were in Reality what it only represents. He makes Musical Automata or Instruments of themselves to play exceedingly well on the Flute, Flaggelet, or Organ, Setts of Country Dances, Minuets, Jiggs and the Opera Tunes, or the most perfect imitation of the Aviary of Birds above-mentioned, fit for the Diversion of those in places where a Musician is not at hand. He makes also organs performing of themselves Psalm Tunes with two, three or More Voluntaries, very convenient for Churches in remote Country Places, where Organists cannot be had, or have sufficient Encouragement. And finally he mends Watches and Clocks in such sort that they will perform to an Exactness which possibly thro' defect in finishing or other Accidents they formerly could not."

A Curious Clock.

Rev. John Wesley in his journal gives the following account of a talking clock:

"On Monday, April 27, 1762, being at Lurgan, in Ireland, I embraced the opportunity which I had desired, of talking to Mr. Miller, the contriver of that statue which was in Lurgan when I was there before. It was the figure of an old man standing in a case, with a curtain drawn before him, over against a clock, which stood on the opposite side of the room. Every time the clock struck he opened the door with one hand, drew back the curtain with the other, turned his head as if looking round on the company, and then said, with a clear, loud, articulate voice, past one, or two, or three, and so on. But so many came to see this (the like of which all allowed was not to be seen in Europe) that Mr. Miller was in danger of being ruined, not having time to attend to his own business. So as none offered to purchase it or reward him for his pains, he took the whole machine to pieces."

Effects of Alcohol.—Experiments made by Drs. Ringer and Rickards on men and animals go to show that the temperature of the body falls nearly as fast after the use of alcohol in doses sufficient to produce intoxication, as after death itself. The facility with which drunkards freeze to death, is explained by this fact.—Dr. Jolly declares that an increasing tendency towards mental disease has been generated by the increasing consumption of spirits. Official reports show that the abuse of alcohol accounts for one fifth of the insanity in France.

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Foreign Patents.

American Inventors should bear in mind that, as a general rule, an invention which is valuable to the patentee n this country is worth equally as much in England and some other foreign countries. In England the law does not protect the right of a foreign inventor as against the first introducer of an invention from abroad. For twenty years past the great majority of patents taken out by Americans in foreign countries have been obtained through Munn & Co's agency. Patents are secured with the utmost dispatch in Great Britain, France, Prussia, Belgium, Russia, Austria, Italy, The Netherlands, Spain, Sweden, Australia, and other foreign countries. Models are not required, but the utmost care and experience are necessary in the preparation of applications. Patentees who intend to take out Foreign Patents should send to us for a Pamphlet of full advice. Address

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The first inquiry that presents itself to one who has made any improvement or discovery is: "Can I obtain a Patent?" A *positive* answer can only be had by presenting a complete application for a Patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After a season of great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning.

If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

We (MUNN & CO.) have been actively engaged in the business of obtaining patents for over twenty years—*nearly a quarter of a century.* Many thousands of inventors have had benefit from our counsels. More than one-third of all patents granted are obtained by us.

Those who have made inventions and desire to consult with us, are cordially invited to do so. We shall be happy to see them in person, at our office, or to advise them by letter. In all cases they may expect from us an *honest opinion.* For such consultations, opinion, and advice, *we make no charge.* A pen-and-ink sketch, and a description of the invention should be sent, together with stamps for return postage. Write plainly do not use pencil nor pale ink; be brief.

All business committed to our care, and all consultations, are kept by us *secret and strictly confidential.* Address MUNN & CO., 37 Park Row, New York.

Caveats.—A Caveat gives a limited but immediate protection, and is particularly useful where the invention is not fully completed, or the model is not ready, or further time is wanted for experiment or study. After a Caveat has been filed, the Patent Office will not issue a patent for the same invention to any other person, without giving notice to the Caveator, who is then allowed three months time to file in an application for a patent. A Caveat, to be of any value, should contain a clear and concise description of the invention, so far as it has been completed, illustrated by drawings when the subject admits. A Caveat consists of the Petition, Oath, Specification, and Drawings. The Government fee for filing a Caveat is $10, and our ordinary charge to prepare the documents and attend to the whole business from $10 to $15. In order to file a Caveat the inventor needs only to send us a letter containing a sketch of the invention, with a description in his own words, and fees, $25 in full. Address MUNN & CO., 37 Park Row, N. Y.

Additions can be made to Caveats at any time. A Caveat runs one year, and can be renewed on payment of $10 a year for as long a period as desired.

In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions,—smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, $16. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is $25, for the simplest cases, up to $35, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, $20 more is paid the Government, making a total of $61 for the simplest case.

The model should be neatly made of any suitable materials, strongly fastened, without glue, varnished or painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

New medicines or medical compounds, and useful mixtures of all kinds, are patentable.

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